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Hurricanes —The Basics

■ In this satellite photo from September 14, 1999, Hurricane Floyd stalls off the coast of Florida. In the following days, Floyd paralleled the coast eventually making landfall in the Carolinas. Floyd weakened slightly during this time, but caused extensive flooding in several Atlantic coast states, especially North Carolina and Pennsylvania. Damage due to Floyd was estimated at 3 to 6 billion dollars. In addition, 57 deaths were attributed to Floyd in several states.

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The sustained winds of a hurricane can reach speeds of 74 to 160 miles per hour. The highest sustained winds in a hurricane were recorded in 1969 in Hurricane Camille. With winds of 190 miles per hour, Camille may be the most intense storm of any kind to strike the American mainland.

Hurricanes develop at sea, but their damaging winds can extend hundreds of miles inland. In addition to intense winds, hurricanes can spawn tornados and cause extensive floods due to torrential rain. Following a hurricane, inland streams and rivers can flood and trigger landslides. More dangerous still is the storm surge that piles up in front of an approaching hurricane. This dome of ocean water can be 20 feet at its peak and 50 to 100 miles wide. The surge can devastate coastal communities as it sweeps ashore. Nine out of 10 hurricane fatalities are attributable to the storm surge. The tremendous power of a hurricane can cause incredible damage to property and loss of life.

The National Weather Service predicts the path of hurricanes and tropical storms five days in advance. Residents in areas that may be affected should “prepare to prepare” by gathering materials to protect homes and assemble disaster kits. Waiting until the last minute only guarantees frayed nerves and shortages.

When the chances of a hurricane striking are significant, a **hurricane watch** will be issued. When a hurricane is expected to strike within 24 hours, the watch will be upgraded to a **hurricane warning**. When a watch is issued, the best response is to protect your property by boarding up windows, bringing in outside items, and being prepared to evacuate the area as soon as officials advise.

Danger Zones

Areas in the United States vulnerable to hurricanes include the Atlantic and Gulf coasts from Texas to Maine, the territories in the Caribbean, and tropical areas of the western Pacific, including Hawaii, Guam, American Samoa and Saipan.

What is a Hurricane?

A hurricane is a tropical storm with winds that have reached a constant speed of 74 miles per hour or more. Hurricane winds blow in a large spiral around a relatively calm center known as the “eye.” The eye is generally 20 to 30 miles wide, and the storm may extend outward 400 miles. As a hurricane approaches, the skies will begin to darken and winds will grow in strength. Near land, a hurricane can bring torrential rains, high winds, and storm surges. A single hurricane can last for more than 2 weeks over open waters and can run a path across the entire length of the eastern seaboard. August and September are peak months during the hurricane season, from June 1 through November 30.

Help Your Community Get Ready

There are many activities that can help raise community awareness. Examples include:

- Publish a special section in your local newspaper with emergency information on hurricanes. Print phone numbers of local emergency services, American Red Cross, and hospitals.
- Provide hurricane tracking charts to local schools.
- Work with local emergency services and American Red Cross officials to prepare special reports for people with mobility impairments on what to do if an evacuation is ordered.
- Stage a simulated evacuation to show your community what can happen.
- Host an informational expo at a mall or shopping center. Area media, emergency services, Extension, utilities, and other agencies and organizations can participate.

Did You Know...

In a 4-week period in 1992, two major hurricanes hit the U.S., leaving an unprecedented array of devastation. First, Hurricane Andrew pounded Florida and Louisiana, becoming one of the most expensive natural disasters in U.S. history with damage estimated at \$26.5 billion. Three weeks later, Hurricane Iniki struck Hawaii, resulting in over \$1 billion in damage, particularly in Kauai. In 2004, Florida was impacted state-wide by Hurricanes Charley, Frances, Ivan and Jeanne.

Eighteen of the 54 direct deaths attributed to Hurricane Andrew occurred during the recovery phase. Of those identified, eight were stress-induced heart attacks, three were either people falling in damaged buildings or hit by debris while cleaning up, and two were children who died in fires in damaged homes.

On average, 10 tropical cyclones develop in the North Atlantic each year. Of these, six may strengthen to hurricanes, of which two are likely to strike the coast of the United States.

Hurricane winds in the northern hemisphere circulate in a counterclockwise motion around the hurricane’s center or eye; hurricane winds in the southern hemisphere circulate clockwise.

The Galveston, Texas hurricane in 1900 resulted in an estimated 8,000 deaths, the most deaths attributed to a hurricane in United States history.



Personal Hurricane Response

Hurricanes can be dangerous killers. Learning the hurricane warning messages and planning ahead can reduce the chances of injury or major property damage.

Before

Plan an evacuation route. Contact the local emergency management office or American Red Cross chapter and ask for the community hurricane preparedness plan. This plan tells the safest evacuation routes and nearby shelters. Learn safe routes inland. Be ready to drive 20 to 50 miles inland to locate a safe place.

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Have these disaster supplies on hand:

- Flashlight and extra batteries
- Tool kit
- Portable, battery-operated radio and extra batteries
- First aid kit and manual
- Emergency food and water (for 3 days)
- Nonelectric can opener
- Essential medicines
- Cash and credit cards
- Sturdy shoes
- Blankets and pillows
- Extra set of home and car keys
- Vehicle fuel tanks full

Make arrangements for pets. Pets may not be allowed into emergency shelters for health and space reasons. Contact your local humane society for information on local animal shelters and pet-friendly hotels and shelters. You can also check the Internet for names of pet-friendly accommodations in your area. Prepare pet disaster kits that include:

- Pet registration and immunization records
- Food and water
- Carrier or cage

- Medications
- Leash and/or muzzle

Ensure that family members know what to do after a hurricane. Teach them how and when to turn off gas, electricity, and water. Teach children how and when to call 911, the police or the fire department and which radio station carries emergency information. Your area may have a 311 emergency information number to get up-to-date reports to and report non-life-threatening situations.

Protect your windows. Permanent shutters are the best protection. A lower-cost approach is to put up plywood panels. Use 1/2-inch plywood—marine plywood is best—cut to fit each window. Remember to mark which board fits which window. Pre-drill holes every 18 inches for screws. Do this long before the storm.

Trim back dead or weak branches from trees.

Check into flood insurance. You can find out about the National Flood Insurance Program through your local insurance agent or emergency management office. There is normally a 5-day waiting period before a new policy becomes effective. Homeowners' policies do not cover damage from hurricane-caused flooding.

Develop an emergency communication plan. Family members can be separated from one another during a disaster (for example, when adults are at work and children are at school). Have a plan for getting back together. Ask an out-of-state relative or friend to serve as the “family contact.” After a disaster, it’s often easier to call long distance. Make sure everyone in the family knows the name, address and phone number of the contact person. Numbers also can be programmed into family members’ phones.

Hurricane Watches and Warnings

A hurricane watch means there is a **possibility** of hurricane conditions within 36 hours.

A hurricane warning is issued when hurricane conditions (winds of 74 miles per hour or greater, or dangerously high water and rough seas) are **expected** in 24 hours or less.

In 2003, the National Hurricane Center began issuing 5-day hurricane forecasts; previously only 3-day forecasts were issued. The forecast predicts the most likely path that a hurricane will follow.

During a Hurricane Watch

- Listen to a radio or television for storm reports (have a working, battery-operated radio nearby).
- Check emergency supplies.
- Fuel car.
- Bring in outdoor objects such as lawn furniture, toys and garden tools and anchor objects that cannot be brought inside.
- Secure buildings by closing and boarding up windows. Remove outside antennas.
- Turn refrigerator and freezer to coldest settings. Open only when absolutely necessary and close quickly.
- Store drinking water in clean jugs, bottles, and cooking utensils.
- Review evacuation plan.

- Moor boat securely or move it to a designated safe place. Use rope or chain to secure boat to trailer. Use tie-downs to anchor trailer to the ground or house.

During a Hurricane Warning...

- Listen constantly to a battery-operated radio or television for official instructions.
- If in a mobile home, check tie-downs and evacuate immediately.
- Store valuables and personal papers in a waterproof container on the highest level of your home or take them with you.
- Avoid elevators.

If at home:

- Stay inside, away from windows, skylights and glass doors.
- Keep flashlights and extra batteries handy. Avoid open flames, such as candles and kerosene lamps, as a source of light.
- If power is lost, turn off major appliances to reduce power surge when electricity is restored.
- Remember that cordless non-cellular phones will not work if the electricity is out.

If officials indicate evacuation is necessary:

- Leave as soon as possible. Avoid flooded roads and watch for washed-out bridges.
- Secure your home by unplugging appliances and turning off electricity and the main water valve.
- Tell someone outside of the storm area where you are going.
- If time permits, and you live in a surge zone, protect furniture from flooding by elevating it or move it to a higher floor.
- Bring pre-assembled emergency supplies and warm protective clothing.
- Take blankets and sleeping bags to shelter.
- Lock up home and leave.

After the Hurricane Has Passed

Stay tuned to local radio for information.

- Help injured or trapped persons.
 - Give first aid where appropriate.
 - Do not move seriously injured persons unless they are in immediate danger of further injury.
 - Call for help.
- Return home only after authorities advise that it is safe to do so.
- Avoid loose or dangling power lines and report them immediately to the power company, police or fire department.

- Enter your home with caution.
 - Beware of snakes, insects and animals driven to higher ground by flood water.
 - Open windows and doors to ventilate and dry your home.
 - Check refrigerated foods for spoilage.
- Take pictures of the damage, both to the house and its contents for insurance claims.
- Drive only if absolutely necessary. Avoid flooded roads and washed-out bridges.
- Use telephone only for emergency calls.

Inspecting Utilities in a Damaged Home

Check for gas leaks. If you smell gas or hear a blowing or hissing noise, open a window and quickly leave the building. Turn off the gas at the outside main valve if you can and call the gas company from a neighbor's home. If you turn off the gas for any reason, it must be turned back on by a professional.

Look for electrical system damage. If you see sparks or broken or frayed wires, or if you smell hot insulation, turn off the electricity at the main fuse box or circuit breaker. Don't step in water to get to the fuse box or circuit breaker; call an electrician for advice.

Check sewage and water lines for damage. If you suspect sewage lines are damaged avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid water from the tap. Obtain safe water by melting ice cubes.

Mitigation

Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in preventive mitigation steps now such as strengthening unreinforced masonry to withstand wind and flooding and installing shutters on every window will help reduce the impact of hurricanes in the future. For more information on mitigation, contact your local emergency management office.



■ On August 24, 2005, Tropical Storm Katrina had just become a hurricane. Atmospheric conditions made it difficult for storm track models, pictured above, to agree on Katrina's path. The hurricane would become a major hurricane and eventually make landfall near New Orleans, Louisiana, causing unprecedented damage.

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Glossary of Hurricane Terms

Closest Point of Approach (CPA) — Point where hurricane eye comes closest to shore without making landfall.

Coastal Flood Warning — A warning that significant wind-forced flooding is expected along low-lying coastal areas if weather patterns develop as forecast.

Coastal Flood Watch — An alert that significant wind-forced flooding is expected along low-lying coastal areas if weather patterns develop as forecast.

County Division of Emergency Management — Local government organization created to discharge emergency management responsibilities and functions of the county.

County Emergency Operations Center (EOC) — The county facility that serves as a central location for the coordination and control of all emergency preparedness and response activities.

Emergency Alert System (EAS) — A system designed to permit government officials to issue up-to-date and continuous emergency information and instructions to the public in case of a threatened or actual emergency. Established in 1994, EAS replaced the Emergency Broadcast System (EBS), created by the Kennedy Administration in 1963.

Emergency Public Information — Information which is disseminated primarily, but not unconditionally, at the actual time of an emergency; and in addition to providing information as such, frequently directs actions, instructions and transmits direct orders.

Emergency Public Shelter — Generally a public school or other such structure designated by county officials as a place of refuge.

Evacuation Time — The lead time that a populated coastal jurisdiction must have to safely relocate all residents of vulnerable areas from an approaching hurricane. This time can also be perceived as the necessary amount of time

between the issuance of the local official evacuation order and the arrival of sustained gale force winds (40 mph) and/or flooding.

Extent of Evacuation — The identification of vulnerable people who must evacuate as a result of various hurricane scenarios, based on estimated inundation areas and/or dwelling units susceptible to hurricane force winds.

Flood Warning — Indicates the expected severity of flooding (minor, moderate or major), as well as where and when the flooding will begin.

Forward Speed (Hurricane) — The rate of movement (propagation) of the hurricane eye in miles per hour or knots.

Gale Warning — Is defined as sustained winds within the range 39-54 miles an hour (34-47 knots), either predicted or occurring. NOTE: Gale warnings are not normally issued during tropical cyclone situations.

Hurricane — The term is used when winds reach constant speed of 74 miles per hour or more. These winds blow in a large spiral around a relatively calm center of extremely low pressure known as the eye of the hurricane. Around the rim of the eye, winds may gust to more than 200 miles per hour. The entire storm dominates the ocean surface and lower atmosphere over tens of thousands of square miles.

Hurricane Advisories — Notices numbered consecutively for each storm, describing the present and forecasted position and intensity of the storm. Advisories are issued at six-hour intervals at midnight, 6:00 a.m., noon, and 6:00 p.m., Eastern Daylight Time. Bulletins provide additional information. Each message gives the name, eye position, intensity and forecasted movement of the storm.

Hurricane Eye — The relatively calm area near the center of the storm. In this area winds are light and the sky is often partly covered by clouds.

Hurricane Eye Landfall — The point in time when the eye, or physical center of the hurricane, reaches the coastline from the hurricane's approach over water.

Hurricane Path or Track — Line of movement (propagation) of the eye through an area.

Hurricane Season — The portion of the year having relatively high incidence of hurricanes. In the Atlantic, Caribbean and Gulf of Mexico, it is usually regarded as the period from June 1 through November 30.

Hurricane/Tropical Storm Probabilities — National Weather Service issues hurricane/tropical storm probabilities in public advisories to realistically assess the threat of a hurricane or tropical storm hitting your community. The probabilities are defined as the chance in percent that the center of the storm will pass within approximately 65 miles of 44 selected locations from Brownsville, Texas to Eastport, Maine.

Hurricane Warning — An alert added to a hurricane advisory when hurricane conditions are expected within 24 hours. Hurricane warnings identify coastal areas where winds of at least 74 miles per hour are expected to occur. A warning may also describe coastal areas where dangerously high water or exceptionally high waves are forecast, even though winds may be less than hurricane force.

Hurricane Watch — An alert added to a hurricane advisory covering a specified area and duration. A hurricane watch means that hurricane conditions are a real possibility; it does not mean they are imminent. When a hurricane watch is issued, everyone in the area covered by the watch should listen for further advisories and be prepared to act quickly if hurricane warnings are issued.

Pre-Eye Landfall Time — The time before actual hurricane eye landfall or closest point of approach (CPA) within which evacuation cannot be carried out because of earlier effects such as the inundation of evacuation routes from the storm surge or rainfall and the arrival of sustained gale force winds. It is composed of the time of arrival of sustained gale force winds or the time roadway inundation from storm surge/rainfall begins, whichever comes first.

Public Information Officer (PIO) — An individual appointed by County Emergency Operations Center (EOC) to be responsible for the formulating and coordinating of the dissemination of emergency public information with both the electronic and written media, ensuring that accurate information is being released to the general public.

Severe Thunderstorm Warning — Indicates that severe thunderstorms have been sighted or indicated on radar.

Severe Thunderstorm Watch — Indicates that conditions are favorable for severe thunderstorms that may include lightning, damaging winds greater than 58 miles and hail and/or heavy rainfall.

Shelter Period — The interval of time from that point of evacuation until the primary situation or event has decreased to a level which will permit people to leave designated emergency public shelters. This time may vary from several hours to a couple of days depending upon the degree of the severity of the hurricane event.

SLOSH (sea, lake and overland surges from hurricanes) — A computerized model which is able to estimate the overland tidal surge heights and winds that result from hypothetical hurricanes with selected characteristics in pressure, size, forward speed, track and winds. The resultant tidal surge action is then applied to a specific locale's shoreline configuration, while also incorporating the unique bay and river configurations, water depths, bridges, roads and other physical features. The model estimates open coastline heights as well as surge heights over land, thus predicting the degree of propagation or run-up of the surge into inland areas.

Small Craft Advisory — A warning of winds from 20 to 33 knots inclusive or for sea conditions, either forecasted or occurring, which are considered potentially hazardous to small boats in coastal waters.

Special Marine Warning — A warning for hazardous weather conditions, usually of short duration, not adequately covered by existing marine warnings. Such weather conditions include sustained winds or gusts of 35 knots or more with a duration of 2 hours or less.

Squall — A sudden increase of wind speed by at least 18 miles per hour (16 knots) and rising to 25 miles per hour (22 knots) or more and lasting for at least one minute.

Storm Surge — The high and forceful dome of wind-driven waters sweeping along the coastline near where the eye makes landfall or passes close to the coast.





■ At the time of this photograph, Hurricane Isabel (1996) was a category 3 hurricane. In the next few days, it would strengthen to category 5 with winds near 160 miles per hour.

■ Adapted by UF/IFAS from the National Oceanographic and Atmospheric Administration (NOAA).

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The Saffir/Simpson Hurricane Scale

The Saffir/Simpson Hurricane Scale is used by the National Weather Service to give public safety officials an assessment of the potential wind and storm surge damage from a hurricane. Scale numbers are available to public safety officials when a hurricane is within 72 hours of landfall. Scale assessments are revised regularly as new observations are made. Public safety organizations are kept informed of new estimates of the hurricane's disaster potential.

Scale numbers range from 1 to 5. Category No. 1 begins with hurricanes in which the maximum sustained winds are at least 74 miles per hour, while Category No. 5 applies to hurricanes with maximum sustained winds of 155 mph or more.

The scale was developed by Herbert Saffir, Dade County, Florida Consulting Engineer, and Dr. Robert H. Simpson, a former National Hurricane Center Director. Scale assessment categories are as follows:

Category No. 1—Winds of 74 to 95 mph. Damage primarily to shrub and tree foliage, and unanchored mobile homes. No major damage to other structures. Some damage to poorly constructed signs. Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings. Examples are Hurricanes Irene (1999) and Allison (1995).

Category No. 2—Winds of 96 to 110 mph. Considerable damage to shrub and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roofing materials of buildings; some window and door damage. No major damage to buildings. Coastal roads and low-lying inland escape routes cut by rising water two to four hours before arrival of the hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Examples are Hurricanes Bonnie (1998), Georges (1998), and Gloria (1985).

Category No. 3—Winds of 111 to 130 mph. Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some damage to roofing materials of buildings; some window and door damage. Some structural damage to small buildings. Mobile homes destroyed. Serious flooding

at coast and many smaller structures near coast destroyed; large structures near coast damaged by battering waves and floating debris. Low-lying inland escape routes cut by rising water 3 to 5 hours before hurricane center arrives. Examples are Hurricanes Keith (2000), Fran (1996), Opal (1995), Alicia (1983), and Betsy (1965).

Category No. 4—Winds of 131 to 155 mph. Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows and doors. Complete failure of roofs on many small residences. Complete destruction of mobile homes. Major damage to lower floors of structures near shore due to flooding and battering by waves and floating debris. Low-lying inland escape routes cut by rising water three to five hours before hurricane center arrives. Major beach erosion. Examples are Hurricanes Andrew (1992), Hugo (1989), and Donna (1960).

Category No. 5—Winds greater than 155 mph. Shrubs and trees blown down; considerable damage to roofs of buildings; all signs down. Very severe damage to windows and doors. Complete failure of roofs on many residence and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings overturned or blown away. Complete destruction of mobile homes. Storm surge greater than 18 feet above normal tide. Low-lying inland escape routes cut by rising water three to five hours before hurricane center arrives. Massive evacuation may be required. Examples are Hurricane Camille (1969) and the Labor Day Hurricane (1935).

The Saffir/Simpson Scale

Category	Sustained Winds (miles per hour)	Damage
1	74 – 95	Minimal
2	96 – 110	Moderate
3	111 – 130	Extensive
4	131 – 155	Extreme
5	155 and up	Catastrophic



LOCATION	A	B	C	D	E
26.2N 81.0W	48	X	X	X	48
26.3N 82.0W	32	1	X	X	33
26.7N 83.0W	15	8	2	1	26
MUHA 230N 824W	X	2	1	2	5
MYNN 251N 775W	X	X	X	2	2
MYGF 266N 787W	99	X	X	X	99
MARATHON FL	18	1	X	1	20
MIAMI FL	99	X	X	X	99
W PALM BEACH FL	99	X	X	X	99
FT PIERCE FL	53	X	X	X	53
COCOA BEACH FL	32	X	X	1	33
DAYTONA BEACH FL	14	4	2	2	22
JACKSONVILLE FL	1	5	4	6	16
SAVANNAH GA	X	X	2	7	9

Fact Sheet — Hurricane and Tropical Storm Probabilities

The National Weather Service issues hurricane and tropical storm probabilities in public advisories. The probabilities are used to realistically assess the threat of a hurricane or tropical storm hitting your community. The probabilities are defined as the chance in percent that the center of the storm will pass within approximately 65 miles of 44 selected locations from Brownsville, Texas to Eastport, Maine. Probabilities are intended primarily for decision makers in local government and private industry who must begin protective actions early. Your local emergency management officials use probabilities to help decide when to open shelters and begin evacuation. The probability figures are available through the news media.

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Probabilities are issued four times a day. The times are: 5 a.m., 11 a.m., 5 p.m., and 11 p.m. Eastern Daylight Time. The probability advisories are appended to the public advisories in tabular form.

There are several key points to remember. First, if you live between two listed locations you may estimate your chance of being affected by averaging the numbers on either side. Second, to assess your threat, compare the probability of your community with those of neighboring locations. If you have the highest value, your hurricane threat is greatest.

Finally, be sensitive to increasing values from one advisory to the next. Increasing probabilities indicate a greater risk than when probabilities remain the same or decrease.

When the hurricane is 36 to 72 hours from predicted landfall, probabilities are quite low. The numbers increase more rapidly as the storm is closer than 36 hours. If a storm is forecast to be directly over your location in 72 hours, the maximum probability is 10%. At 48 hours from predicted landfall, the maximum probability is 13 to 18%. At 36 hours the maximum probability is 20 to 25%. At 24 hours the maximum probability is 35 to 45%. When the storm is less than 24 hours from forecast landfall the values increase even more rapidly to 60 to 70% probability.

If you live in an area that requires a long time to evacuate, you may have to leave when probability values are low. Listen carefully to your elected officials concerning evacuation for your community. Heed their advice. If you wait too long your escape route may be cut off by rising storm tides as the hurricane gets closer.

Use caution when interpreting the probabilities. Potential loss of life and property will vary depending on the intensity of the storm. The probability figures do not tell you about intensity. Intensity information is given in the advisory. Secondly, you must not confuse hurricane and tropical storm probabilities with precipitation probabilities. Precipitation probabilities are routinely included in Weather Service forecasts. Not only are the two probabilities computed differently, but the implications of being rained on and being hit by a hurricane are markedly different.

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000
WTNT72 KNHC 251437
SPFAT2
TROPICAL STORM KATRINA PROBABILITIES NUMBER 8
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
11 AM EDT THU AUG 25 2005

PROBABILITIES FOR GUIDANCE IN HURRICANE PROTECTION
PLANNING BY GOVERNMENT AND DISASTER OFFICIALS

AT 11 AM EDT...1500Z...THE CENTER OF KATRINA WAS LOCATED NEAR
LATITUDE 26.2 NORTH...LONGITUDE 79.3 WEST

CHANCES OF CENTER OF THE STORM PASSING WITHIN 65 NAUTICAL MILES
OF LISTED LOCATIONS THROUGH 8AM EDT SUN AUG 28 2005

LOCATION              A  B  C  D  E  LOCATION              A  B  C  D  E
26.2N 81.0W         48  X  X  X 48  FT MYERS FL          35  1  X  X 36
26.3N 82.0W         32  1  X  X 33  VENICE FL            24  4  1  X 29
26.7N 83.0W         15  8  2  1 26  TAMPA FL             17  6  2  1 26
MUHA 230N 824W       X  2  1  2  5  CEDAR KEY FL          3  9  4  4 20
MYNN 251N 775W       X  X  X  2  2  ST MARKS FL           X  1  6  8 15
MYGF 266N 787W      99  X  X  X 99  APALACHICOLA FL      X  1  5  9 15
MARATHON FL         18  1  X  1 20  PANAMA CITY FL       X  X  3 10 13
MIAMI FL            99  X  X  X 99  PENSACOLA FL         X  X  X 10 10
W PALM BEACH FL     99  X  X  X 99  MOBILE AL            X  X  X  7  7
FT PIERCE FL        53  X  X  X 53  GULFPORT MS          X  X  X  7  7
COCOA BEACH FL      32  X  X  1 33  BURAS LA             X  X  X  7  7
DAYTONA BEACH FL    14  4  2  2 22  NEW ORLEANS LA       X  X  X  5  5
JACKSONVILLE FL    1  5  4  6 16  NEW IBERIA LA        X  X  X  3  3
SAVANNAH GA         X  X  2  7  9  GULF 29N 85W         X  1  8  8 17
CHARLESTON SC       X  X  1  5  6  GULF 29N 87W         X  X  2 10 12
MYRTLE BEACH SC     X  X  X  3  3  GULF 28N 89W         X  X  X  9  9
WILMINGTON NC       X  X  X  2  2  GULF 28N 91W         X  X  X  5  5
KEY WEST FL         12  3  1  1 17  GULF 28N 93W         X  X  X  2  2
MARCO ISLAND FL     34  X  X  X 34

COLUMN DEFINITION  PROBABILITIES IN PERCENT
A IS PROBABILITY FROM NOW TO 8AM FRI
FOLLOWING ARE ADDITIONAL PROBABILITIES
B FROM 8AM FRI TO 8PM FRI
C FROM 8PM FRI TO 8AM SAT
D FROM 8AM SAT TO 8AM SUN
E IS TOTAL PROBABILITY FROM NOW TO 8AM SUN
X MEANS LESS THAN ONE PERCENT

FORECASTER STEWART

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Example -- The public advisory shown to the left is taken from the National Hurricane Center Web site: <www.nhc.noaa.gov>.

The strike probabilities are listed in the table at the center of the advisory.

The probabilities are listed in the columns labeled "A," "B," "C," "D," and "E." These letters refer to increasing amounts of time after the advisory. For example, the A column gives the probability that the storm will strike within 65 miles of the listed location within 21 hours after the advisory.

Take a look at the line in the table for Tampa, Florida. This line shows that there is a 17% chance that the storm will strike within 65 miles of Tampa during the 21 hours following this advisory.

Take a look at the line for Miami, Florida. You can see that at the time of this advisory there is a 99% chance that the storm will strike within 65 miles of Miami.



Hurricane Tracking Chart



Hurricane Tracking Chart

Hurricane season for the United States runs from June 1 to November 30. During that time, the National Weather Service monitors the Tropics very closely for the formation of “tropical waves.” These are areas of low pressure and thunderstorms that can begin to circulate and become tropical storms and hurricanes. These waves can form as far away as the coast of Africa and drift all the way across the Atlantic Ocean, becoming, tropical depressions, then tropical storms, and sometimes hurricanes.

When a storm develops, the National Weather Service (NWS) begins to issue reports every six hours until the storm dissipates. Listen for these reports on radio or television or read them on the Internet at 5a.m., 11 a.m., 5 p.m., and 11 p.m. Eastern Daylight Time.

As part of these reports, the NWS gives the current location of the storm. Use the map on the front of this sheet to chart the path of the storm. You will learn something about how hurricanes move and tracking the storm will make you more aware of the need to prepare.

Definitions

Tropical Wave — An area of low pressure and thunderstorms that can develop into a tropical depression.

Tropical Depression — When a tropical wave begins to circulate and develop some structure, it becomes a tropical depression.

Tropical Storm — When a tropical depression has sustained winds of 35 miles an hour or more, it becomes a tropical storm. At this point, it will receive a name.

Hurricane — As a tropical storm passes over warm water, it gains energy and it increases in wind speed and size. When sustained winds reach 74 miles an hour, the storm becomes a hurricane. Hurricanes are classified by their sustained wind speeds according to the Saffir-Simpson Scale. Hurricanes can fall into categories from 1 to 5, the higher the number, the more intense the hurricane.

Watch — There is a **possibility** that a tropical storm or hurricane may strike a specific area within 36 hours. Time to prepare!

Warning — A tropical storm or hurricane is **expected** to strike a specific area within 24 hours.

■ IFAS publication DPR-0707. Published June 1998, revised August 2005. It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For complete list of program products, visit: <disaster.ifas.ufl.edu>.

■ General editor: Carol J. Lehtola, Agricultural and Biological Engineering Department, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida 32611.

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Keys to Hurricane Safety

Before a Hurricane Threatens

✓ **Know your home's elevation above sea level.**

This information is often available from county planning or zoning offices or from your insurance company. This information may also be available through Internet sources.

✓ **Are you vulnerable to storm surge?**

Coastal areas are susceptible to storm surge damage. Individuals in coastal areas should pay careful attention to local authorities regarding evacuation. Keep disaster supplies organized so that you can leave promptly.

✓ **Is it safe for you to stay at home?**

Have your home evaluated by a qualified building inspector and retrofit as needed. If you live near the shore or in a mobile home, plan to evacuate.

✓ **Know the location of nearest shelter.**

Emergency Management or Red Cross personnel can give you the location of the shelter nearest your home and explain what you should bring with you. Plan for your family's safety. Know how to contact family members should the need arise.

✓ **Plan a route to safety if you must leave.**

Plan your escape route early. Research low points and flooding history of your route and plan an alternative. Avoid peak evacuation traffic by leaving early.

✓ **Inventory your property.**

A complete inventory of personal property will help in obtaining insurance settlements and/or tax deductions for losses.

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An inventory checklist can be obtained from many sources, including your insurance representative. Do not trust your memory. List descriptions and take pictures. Store these and other important insurance papers in waterproof containers at home or in your safety deposit box. You may wish to keep copies of your most important papers in both locations.

Check insurance coverage.

Review your insurance policies and your coverage to avoid misunderstandings later. Take advantage of flood insurance. Separate policies are needed for protection against wind and flood damage, which people frequently do not realize until too late. Do not wait until a hurricane is approaching. By then it is too late. When a storm is heading to shore, insurance offices are too busy preparing for the emergency and won't be able to respond to individual requests, and insurance cannot be obtained.

When a Watch is Issued

Make Plans Early

Listen constantly to the radio or the TV. Monitor storm reports and keep a log of hurricane positions. Remember, evacuation routes sometimes can be closed up to 20 hours before landfall by wind gusting or storm surge flooding.

If you are considering moving to a shelter, refill needed prescriptions and make arrangements for your pets. Pets are not allowed in most public shelters. Locate pet-friendly shelters or motels before the storm.

If evacuation has not already been recommended, consider leaving the area early enough to avoid long hours on limited evacuation routes.

Check Supplies

- Have a transistor radio with fresh batteries. A radio will be your most useful source of information. Have enough batteries to last several days. There may be no electricity.
- Flashlights, candles or lamps, and matches. Store matches in a waterproof container. Have enough lantern fuel for several days, and know how to use it safely.
- Full tank of gasoline. Never let your vehicle gas tank be less than half-full during hurricane season. Fill the tank as soon as a hurricane watch is posted. Remember, when there is no electricity, gas pumps won't work.
- Canned goods and non-perishable foods. Store packaged foods which can be prepared without cooking and need no refrigeration. There may be no electricity or gas.
- Containers for drinking water. Have clean, air-tight containers to store sufficient drinking water for several days. The city supply will probably be interrupted or contaminated.
- Materials to protect glass openings. Have shutters or lumber to protect large windows and doors and masking tape for use on small windows.
- Materials for emergency repairs. Your insurance policy may cover the cost of materials used in temporary repairs, so keep all receipts (also will be helpful for income tax deductions).

When a Warning is Issued

☒ **Continue listening to radio or TV.**

Continue to monitor hurricane position, intensity and expected landfall. If you live in a mobile home, check tie-downs and leave immediately for a safer place. Mobile homes are not safe in hurricane force winds.

☒ **Prepare for high winds.**

Brace your garage door. Lower antennas. Be prepared to make repairs. Anchor outside objects. Garbage cans, awnings, loose garden tools, toys and other loose objects can become deadly missiles. Anchor them securely or move them indoors.

☒ **Protect windows and other glass.**

Board up or shutter large windows securely. Tape exposed glass to reduce shattering. Draw drapes across windows and doors to protect against flying glass if shattering does occur.

☒ **Move boats on trailers close to house.**

Fill boats with water to weight them down. Lash securely to trailer and use tie-downs to anchor the trailer to the ground or house. Check mooring lines of boats in water. Leave the area immediately.

☒ **Store valuables and personal papers.**

Put irreplaceable documents in waterproof containers and store in the highest possible spot. If you evacuate, be sure to take them with you. It is also a good idea to keep copies of your most important papers in an off-site location, such as a safe deposit box.

☒ **Prepare for storm surge, tornados and floods.**

Storm surge, tornados and flash floods are the worst killers associated with a hurricane. During a tornado warning, seek shelter inside, below ground level if possible, or in an interior hallway, closet or bathroom on ground level. If outside, move away at right angles from the tornado; if escape is impossible, lie flat in a ditch or low spot. The surge of ocean water plus flash flooding of streams and rivers due to torrential rains combine to make drowning the greatest cause of hurricane deaths.

☒ **Check your survival supplies again.**

When You “Shelter in Place” at Your Home

☒ **Stay indoors, in an inside room away from doors and windows.**

Stay away from windows and glass doors. Move furniture away from exposed doors and windows. Don’t go outside in the brief calm during passage of the eye of the storm. The lull sometimes ends suddenly as winds return from the opposite direction. Winds can increase in seconds to 75 mph or more.

☒ **Protect property.**

Without taking unnecessary risks, protect your property from damage. Temporary repairs can reduce your losses.

☒ **Stay tuned to media broadcasts.**

Keep a radio or television tuned for information from official sources. Unexpected changes can sometimes call for last minute relocations.

☒ **Remain calm.**

Your ability to meet emergencies will help others.

If You Must Evacuate

☒ **Know where you are going.**

Leave early in daylight if possible. Move your most valuable possessions. Possessions that you can not take with you should be moved to higher points in your home.

☒ **Lock windows and doors.**

Turn off gas, water and electricity in your home. Check to see that you have done everything possible to protect your property from damage and loss.

☒ **Do not travel farther than necessary.**

Roads may become jammed. Do not let your stranded car become your coffin.

☒ **Take survival supplies with you.**

- First-aid kit
- Canned or dried provisions, can opener, spoons, etc.
- Bottled water
- Extra prescriptions and medications for your family
- Spare eyeglasses, hearing aids and batteries, if needed
- Warm, protective clothing

☒ **Keep important papers with you at all times.**

- Driver's license and other identification
- Insurance policies
- Property inventory
- Medic-alert or device to convey special medical information
- Maps to your destination

☒ **Supplies for Shelters**

- Take blankets or sleeping bags, flashlights, special dietary foods, infant needs and lightweight folding chairs.
- Register every person arriving with you at the shelter.
- Do not take pets, alcoholic beverages or weapons of any kind to shelters.
- Be prepared to offer assistance to shelter workers if necessary, and stress to all family members their obligations to keep the shelter clean and sanitary.

After the Hurricane

- ✓ **If you are evacuated, delay your return until it is recommended or authorized by local authorities.**
- ✓ **Beware of outdoor hazards.**

Watch out for loose or dangling power lines, and report them immediately to the proper authorities. Many lives are lost through electrocution.
- ✓ **Walk or drive cautiously.**

Debris-filled streets are dangerous. Snakes and poisonous insects will be a hazard. Washouts may weaken road and bridge structures which could collapse under vehicle weights.
- ✓ **Guard against spoiled food.**

Food may spoil if refrigerator power is off more than a few hours. Freezers will keep food several days if doors are not opened after power failure, but do not refreeze food once it begins to thaw.
- ✓ **Do not use water until safe.**

Use emergency supplies or boil water before drinking until official word is given that the water is safe. Report broken sewer or water mains to the proper authorities.
- ✓ **Take extra precautions to prevent fire.**

Lowered water pressure in city mains and the interruption of other services may make firefighting very difficult after a hurricane.
- ✓ **Insurance**

Insurance representatives will be on the scene immediately following a major disaster to speed up the handling of claims. Notify your insurance agent or broker of any losses, and leave word where you can be contacted.
- ✓ **Take steps to protect property.**

Make temporary repairs to protect property from further damage or looting. Use only reputable contractors (sometimes in the chaotic days following a disaster, unscrupulous operators prey on the unsuspecting). If possible, check contractors through the Better Business Bureau. Keep receipts for materials purchased.
- ✓ **Be patient.**

Hardship cases will be settled first by insurance representatives. Don't assume your settlement will be the same as your neighbor's. Policy forms differ and storm damage is often erratic. In a major catastrophe, the insurance industry will have emergency offices and extra manpower to expedite claim settlements and to speed recovery. Everyone cannot be first.

Responsibility for the clean-up falls to numerous local, state, and federal agencies. A local Emergency Management coordinator (the mayor, county judge or a designated representative) will be on hand to help residents in this effort.





Puntos de Seguridad en Caso de Huracanes

Antes de Que un Huracán Amenaze

☒ **Sepa la elevacion de su casa en relación al nivel del mar.**

Esta informacion se puede obtener en las oficinas locales de Contról en Caso de Emergencias. La oficina del Servicio de Meteorologia mas cercana puede proveer información sobre el nivel de las aguas en canales y arroyos o riachuelos del area.

☒ **Informese de la posible altura máxima de la oleada.**

Informese si su casa puede ser afectada por inundaciones causadas por las oleadas. Información sobre la posibilidad de inundaciones tierra adentro puede ser obtenida en la oficina del Servicio de Meteorologia mas cercana a su hogar.

☒ **Cuán segura esta su casa?**

Planee relocalizarse (moverse) durante una emergencia de huracán, si usted vive cerca de la costa. Si usted vive en una casa mobil siempre planee relocalizarse.

☒ **Sepa donde esta el lugar de refugio más cercano.**

La Administración de Emergencia o la Cruz Roja puede informarle donde esta el lugar de refugio mas cercano a su casa y también le puede informar que debe traer. Planee la seguridad de su familia. Sepa como comunicarse con sus familiares en caso de que se presente una emergencia.

☒ **Planee la ruta de seguridad en caso de que tenga que salir.**

Planee su ruta de escape con anticipación. Infórmese con el personal de la Administración de Emergencia de los puntos bajos y de la historia de inundaciones de su vecindario y donde ocurren las inundaciones. Sepa cuanto tiempo tardará en salir de su casa y llegar a un lugar seguro cuando el movimiento y el tráfico es maximo.

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Haga inventario de su propiedad.

Un inventario de su propiedad personal completo le ayudará a recibir pago por seguro o deducciones de impuestos por sus pérdidas. Listas de inventario se pueden conseguir de muchas fuentes, inclusive de sus representantes de seguro. No dependa de su memoria. Haga una lista de los artículos y sus descripciones y tome fotos. Guarde estos y otros documentos importantes de seguro en un envase a prueba de agua o en su caja de seguridad.



Compruebe su cubierta de seguro.

Para evitar malos entendidos examine sus pólizas y cubiertas de seguro. Aprovechese de seguros contra inundaciones. Para protegerse en contra de daños causados por vientos o inundaciones se necesitan dos pólizas distintas y mucha gente no se da cuenta de esto hasta muy tarde. Cuando la tormenta viene hacia la costa, las oficinas de seguros estarán muy ocupados preparándose para la emergencia y no podrán responder a peticiones individuales y no podrán obtener seguros.

Cuando una Vigilancia Esta en Efecto



Haga planes con anticipación

Escuche constantemente la radio o televisión.

Este al tanto de los reportes de la tormenta y mantenga apuntes en todo momento de la posición del huracán. Recuerde que a veces las rutas de evacuación pueden ser cerradas hasta con 20 horas de anticipación a la llegada de las refagas de viento o de la inundación debida a la oleada.

Si esta considerando moverse a un refugio haga arreglos para las mascotas caseras. En los refugios no se permiten animales. Si esta tomando medicamentos tenga suficiente antes de ir al refugio. Si la evacuación no ha sido todavía recomendada, considere salir con tiempo para así evitar largas horas de espera en las rutas limitadas.



Verifique los abastecimientos

- Tenga un radio transistor con baterías nuevas. Un radio es su medio de información más útil. Tenga suficientes baterías (pilas) para que le duren varios días. Es probable que no haya electricidad.
- Linternas de baterías (pilas), velas o lámparas con combustible y cerillos (fosforos). Guarde cerillos (fosforos) en un envase a prueba de agua. Tenga suficiente combustible para la lámpara por varios días y sepa usarla cuidadosamente.
- Llene el tanque de gasolina. Nunca deje que el tanque de su vehículo tenga menos de medio tanque durante la temporada de huracanes. Llene el tanque tan pronto como la vigilancia sea puesta en efecto. Recuerde: cuando no hay electricidad las bombas de gasolina no funcionan.
- Comidas en lata y comidas no perecederas. Almacene comida envazada al vacío que no necesite ser cocida ni refrigerada. Puede ser que no haya ni electricidad ni gas.
- Envase agua potable. Tenga suficiente agua limpia en envases herméticamente cerrados para varios días. El abastecimiento de agua potable puede ser interrumpido o contaminado.
- Material para proteger aberturas de vidrio. Tenga madera para proteger las ventanas grandes y las puertas y cinta adhesiva para usarse en las ventanas pequeñas.
- Material para reparaciones de emergencia. Puede ser que su póliza de seguros cubra los gastos hechos en materiales y en reparaciones temporeras, mantenga sus recibos. Estos también puede ser deducible, de sus impuestos.

Cuando un Aviso de Huracán esta en Efecto

- ☒ **Continúe escuchando la radio o televisión.**
Este al tanto de los reportes de la posición del huracán, su intensidad y cuando se espera que azote.
- ☒ **Si usted vive en una casa móvil.**
Chequee que las vantanas estén bien sujetas y atadas y salga inmediatamente a un lugar seguro. Una casa móvil no es un lugar seguro contra los vientos fuertes de un huracán.
- ☒ **Prepárese contra vientos fuertes.**
Ata su puerta del garage. Baje las antenas y prepárese para hacer reparaciones.
- ☒ **Asegure todos los objetos en el exterior.**
Los basureros, pabellones, herramientas de jardín, juguetes al igual que cualquier objeto suelto puede convertirse en un proyectil peligroso. Asegure todas estas cosas bien o guárdelas adentro.
- ☒ **Proteja las ventanas y vidrieras.**
Asegure con madera todas las ventanas grandes. Ponga cinta adhesiva a los vidrios para así evitar que se rompan. Proteja las ventanas con las cortinas para evitar que si el viento las rompe, los vidrios no entren.
- ☒ **Mueva botes o remolques (o vaganoes) cerca de la casa.**
Llene los botes con agua para evitar que el viento los levante. Asegure bien los remolques y atelos bien de la casa o de la tierra.
- ☒ **Verifique las ataduras de los botes en agua.**
Alejese de ellos de inmediato.
- ☒ **Asegure propiedades de valor y documentos personales.**
Ponga los documentos irremplazables en envases a prueba de agua y pongalos en un lugar lo mas alto posible. Si tiene que evacuar su hogar no olvide llevarse los.
- ☒ **Prepárese contra oleadas, tornados e inundaciones.**
Oleadas, tornados e inundaciones repentinas son los peores asesinos asociados con un huracán. Durante un aviso de tornado, busque refugio en el primer piso si es posible, en un pasillo interior, baño o en un guardaropa. Si se encuentra afuera muevase en ángulos rectos al tornado, si es imposible escapar, acuestese en el suelo o en una zanja. La oleada del mar y las inundaciones repentinas de arroyos o rios debido a lluvias torrenciales se combinan para causar que una persona pueda ahogarse; esto es la causa principal de muertes en un huracan.
- ☒ **Revise sus artículos de sobrevivencia otra vez.**

Si Usted se Queda en su Casa

- ☒ **Manténgase siempre adentro.**
En un cuarto alejado de las puertas y ventanas. No vaya afuera en la calma temporera durante el paso del ojo del huracán. La calma generalmente termina de momento cuando empiezan vientos fuertes en dirección opuesta. Los vientos pueden aumentar en segundos a 75 millas por hora o mas.
- ☒ **Proteja su propiedad.**
Sin tomar ningún riesgo que no sea necesario, proteja su propiedad contra danos. Arreglos temporeros pueden reducir sus perdidas.

☒ **Manténgase alejado de ventanas y puertas de cristal.**

Mueva todos los muebles lejos de las ventanas y puertas.

Mantenga su radio en sintonía (prendido).

Tenga la televisión o radio sintonizada para recibir información de fuentes oficiales. Cambios inesperados pueden a veces requerir relocalizaciones en el último minuto.

☒ **Mantégase en calma.**

Su habilidad para confrontar emergencias ayudará a otros.

Si Tiene que Evacuar o Salir

☒ **Sepa a donde va.**

Salga temprano, de día si es posible.

☒ **Mueva las propiedades mas valiosas.**

Las posesiones que no pueda llevar contigo, muevalas a un lugar alto en la casa.

☒ **Cierre con seguro las puertas y ventanas.**

Cierre la llave del gas y el agua y desconecte la electricidad de su casa. Asegúrese de que usted ha hecho todo lo posible para proteger su propiedad contra daños o pérdidas.

☒ **No viaje más lejos de lo necesario.**

Los caminos pueden estar congestionados. No deje que su carro se quede estancado pues se puede convertir en su propia tumba.

☒ **Lleve comestibles y utensilios para sobrevivir**

- Botiquín portátil de primeros auxilios
- Provisiones enlatadas o secas, abridores de latas, cucharas, etc.
- Agua potable
- Medicamentos adicionales para su familia
- Un par de anteojos extras, audífonos y baterías (pilas) si son necesarias
- Lleve ropa protectora y que abrigue

☒ **Mantenga con usted documentos importantes en todo momento**

- Licencia de manejar y otras tarjetas de identificación
- Pólizas de seguro
- Información médica
- Inventario de propiedades
- Lleve su “Medic-alert” o lo necesario para dar la información médica necesaria
- Mapa hacia donde va

☒ **Para el refugio**

- Lleve frisas (cobijas), sacos para dormir, linternas, comidas dietéticas especiales y sillas livianas plegadizas.
- Registre cada persona que va con usted en cuanto llegue al refugio.
- No lleve bebidas alcohólicas, animales, ni ningún arma de fuego.
- Este preparado para ofrecer asistencia a empleados de refugio si es necesario e informe a cada miembro de su familia lo necesario e importante que es que mantengan el refugio limpio e higiénico.



Mark Faccin

Preparing for Severe Winds

To help protect your home during a hurricane or severe wind storm:

- Close doors and windows on the side facing the maximum wind force. Lock windows so wind vibrations won't open them.
- Brace large windows on the inside, or cover them outside with boards or plywood. Nail all exterior covering to the reinforced part of the window frame. Improperly supported exterior coverings will cause as much or more damage than no protection.
- Pull curtains and drapes over unprotected glass areas. This could prevent injury from flying glass if the window is broken.
- Make sure drains in exterior stairwells and all rainspouts are open. Clogged rainspouts or drains could cause basement flooding. If necessary, place extensions on downspouts to carry water away from foundations.
- If your home is not equipped with stormproof door sills, place folded towels along the joint between the bottom of doors and the sill to prevent water from being blown under doors.
- Bring inside all small yard items, including potted plants, ornaments, wind chimes, wreaths, etc. High winds can pick up these items and turn them into dangerous missiles.
- Bring lawn furniture, bicycles and light-weight outdoor equipment inside if at all possible. If they can not be brought inside, lay them on the ground and stake them down securely.

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■ In the satellite image above, Hurricane Andrew is hours away from its devastating passage across southern Florida.

■ Adapted by UF/IFAS from the Personal Hurricane Survival Guide by Martin County Public Safety and Martin Cooperative Extension.

■ IFAS publication DPR-0710. Published June 1998, revised August 2005. It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For a complete list of program products, visit: <disaster.ifas.ufl.edu>.

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Take-Home Lessons from Hurricane Andrew

The first tropical storm of the 1992 hurricane season formed on August 14, 1992. It was named Andrew. On August 22, Andrew became a hurricane and rapidly increased in strength to become a Category 4 storm. Andrew gave South Florida only two days to prepare – landfall occurred at 5 am on August 24 near Homestead Air Force Base.

Andrew moved swiftly across South Florida. In the four hours it took to cross the state, Andrew destroyed over 25,000 homes and damaged more than 100,000 others. It was estimated that ninety percent of all the mobile homes in South Dade County were totally destroyed. Hundreds of thousands of people were left homeless and many more without electricity.

Andrew damaged so many buildings of all kinds and buildings from many decades that it left valuable lessons about how buildings fail – or not – when subjected to a Category 4 hurricane. After Andrew, buildings were inspected and damage analyzed, much research was done, and building codes and recommendations were revised. What was learned can benefit you and your home.

The key to Andrew's destructive power was its winds. When Hurricane Andrew struck South Florida, it had *minimum* sustained winds of 140 mph and gusts exceeding 160 in southern Dade County. Unlike most hurricanes, the worst damage occurred 10 to 20 miles *inland* where the homes were newer and there was less tree cover to break the winds.

Construction in South Florida was regulated by the South Florida Building Code, established in 1957 as the strictest in the nation. The Code, observed by Dade and Broward Counties, required buildings at least 30 feet high to withstand winds of 120 mph in all areas (taller buildings and those within 1500 feet of the coastline must withstand higher winds). Most single-family homes are only 15 feet high. At that height, the code called for the house to resist winds of about 109 mph. The reason for the decreased requirement was because friction of the wind along the ground reduces the force of the wind.

The only exception to the 120/109 mph requirement was shingles: they were only



■ Pictured above is the "Hurricane House" operated by the Cooperative Extension Office in St. Lucie County, Florida. This building incorporates many features and technologies that can help it to withstand hurricane-force winds.

■ Adapted by UF/IFAS from Lee County Division of Emergency Management.

■ IFAS publication DPR-0711. Published June 1998, revised August 2005. It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For a complete list of program products, visit: <disaster.ifas.ufl.edu>.

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Hurricane Winds and Your Home — A Self-Inspection Checklist

You can inspect your home to determine if it will stand up to a catastrophic hurricane (category 4 or higher). The following list can help you decide whether to stay at home or leave when high hurricane force winds are expected. You might need to inspect the attic crawl space with a flashlight for some of these questions. An engineer or contractor can also conduct this inspection.

Roof Design

Steep roofs often experience structural failure at the ridges or gable ends where the wind's suction forces are high. Lower or gradually sloped roofs receive damage at roof corners.

1. Is your roof pitch less than 30° from horizontal? Low-pitch roofs are more vulnerable than steeper roofs because the same force that lifts an airplane can help lift up this roof type.
2. Is your roof hipped? Hipped roofs seem to reflect winds better than gable designs. Is your roof hipped?
3. If your roof is gabled, are the gabled ends of masonry construction? Gables of masonry seem to perform better.
4. If your roof is gabled, are there braces behind the trusses at both ends, holding them in place?
5. If your roof is gabled, are the ends of the trusses along the outside walls attached to the tops of the wall at all points with metal hurricane straps?

Roof Bracing

6. Are the roof trusses braced independently; that is, are there braces that connect the trusses together rather than the roof sheathing connecting the trusses together?

Block and Frame Homes

7. Is your home concrete block construction? Concrete block homes are more forgiving of poor craftsmanship. They have more strength than wood framing.

Subroofing Material

8. Is your subroof material plywood sheathing?

Roof Surface

9. What is your roof surface made of?
 - Asphalt or composite shingles—This covering may start to tear off when winds reach 60 mph. Sometimes failure occurs due to installation damage (e.g., small tears left by staple guns or misplaced nails cause the next shingle layer to not lay flat).
 - Clay tiles—This roof covering is good but apt to shatter if hit by flying debris. Loose tiles can become projectiles and damage others.
 - Concrete flat tiles—These do well if they are well bonded to the mortar on the roof. Loose tiles can become projectiles.
 - Gravel—This roof does well if properly maintained. They should be recoated with asphalt and gravel periodically.

Roofing Connections

10. Is the roofing material nailed or stapled?
11. Do the nails or staples actually connect the sheathing to the roof trusses?
12. Do hurricane straps or clips anchor the roof to the walls?

Wind Turbines

13. Is there a wind turbine on your roof? Wind turbines on roofs can be dangerous if not capped and secured during severe winds. If you have one of these on your roof, can the turbine be removed and the opening be capped?

Windows and Doors

14. Do you have hurricane shutters installed on your windows or do you plan to board up your windows? Properly installed hurricane shutters or boards keep winds out of the house, which in turn places less uplift pressure on the roof.

How well did your house do?

If you answered no to many of these questions, you should either consider leaving your home and finding a safer place to stay when hurricane force winds are forecasted to reach 130 mph or greater, or you should strengthen your home to survive these winds. Consult a qualified contractor for further information.



Prior to the Hurricane – a Checklist

When a hurricane watch is announced, it means hurricane conditions are a real possibility. It does not mean a hurricane is imminent. When a hurricane watch is issued, listen for further advisories on a local radio or television station.

This is the time to begin preliminary precautions:

- Fill your car with gas. Make sure the battery is in good condition. Review county and state roadway maps.
- Check your battery-powered equipment. A radio could be your only link with the outside world during and after a hurricane.
- Lower or secure TV and radio antennas (CB or HAM) to prevent antennas from coming in contact with electrical wires. Remove all items from the yard and open patios. Board up windows. Close shutters, awnings, windows and drapes. Tape windows from the inside.
- If you plan to stay home, check your supply of emergency food and water. Emergency food supplies should include: canned fish, chicken or meat, fruits (fresh and dried), soups, juices, milk (fresh or powdered), dry cereal, cookies and bread. Include any other non-refrigerated food necessary for your family. Small families should purchase single-serving size containers. Obtain and fill clean containers with drinking water. Do not store drinking water in used milk containers.
- Pack your valuables in waterproof containers. Valuables include jewelry, titles, deeds, insurance papers, licenses, stocks, bonds, inventory list, etc. Place valuables in a safety deposit box. If you do not have a safety deposit box, keep your valuables with you. Keep important papers with you at all times.
- Refill prescription drugs. Obtain an extra supply of special medication.
- Make arrangements for the safety of your house pets. Pets are not allowed in designated emergency public shelters.
- Make arrangements for the safety of your boats. If the situation warrants a mandatory evacuation, drawbridges will be closed to boat traffic.

■ Adapted by UF/IFAS from the Personal Hurricane Survival Guide by St. Martin County Public Safety and St. Martin Cooperative Extension.

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- Fill clean plastic containers, cooking pots or clean bathtubs with drinking water.
- Turn your refrigerator and freezer to the coldest setting. This preserves food as long as possible in case of a power failure.
- Do not drain your swimming pool. Keep the swimming pool full to approximately 12 inches below the edge, to compensate for expected rainfall.
- Wedge sliding glass doors to prevent them from being lifted from their tracks. Brace your garage door. Protect appliances and furniture. Elevate them above floor level and cover them with plastic.
- Stay tuned to local radio and television stations for official weather statements and emergency instructions for your area.
- If county authorities advise or order evacuation of your area, leave immediately.
- If you plan to go to an emergency public shelter, take these items: drinking water in a plastic container, nonperishable food, medicine, blankets, a complete change of clothing, personal hygiene items, flashlight with extra batteries and bulbs, quiet toys or games for children, plastic trash bags, eating and cooking utensils (plastic or paper), manual can and bottle opener and a portable radio with extra batteries. Remember, alcoholic beverages, pets and weapons are not allowed in emergency public shelters.
- If you leave your home, shut off gas and electricity at the main power source. Shut off water lines to your home. Lock all windows and doors before leaving. Call relatives and friends and let them know what you are doing and where you are going. This will reduce phone system overloading from them trying to get in touch with you.
- If you live inland, away from beaches and low-lying coastal areas, and your home is well-constructed, stay home and make emergency preparations. Do not stay if officials recommend evacuation.
- Be alert for tornado watches and warnings. Hurricanes often spawn tornados. If your area receives a tornado warning, seek inside shelter immediately. Stay away from windows.
- If you stay at home, avoid using electric appliances. Seek refuge in a small, interior area such as a hallway, closet or bathroom.
- If your evacuation route is impassible and you become trapped on low ground, seek refuge in a third or fourth floor hallway of a high rise building.



A&D Marketing

Protecting Mobile Homes

Generally in high winds, mobile homes are much less safe than site-built homes. Mobile homes built before 1977 should be considered even more dangerous as they vary in construction quality because there were no national unified Construction and Safety standards. Mobile home occupants should always seek safety in designated shelters when warned of an approaching tornado or hurricane. Many coastal areas are likely to flood during hurricanes. Learn evacuation routes and shelter locations prior to hurricane season.

High Winds and Flooding

Consider positioning your mobile home to take advantage of the natural wind protection provided by hearty 30-foot or higher wind-resistant trees such as hickory, pecan, live oak, cypress, American ash, pine laurel and water oaks. Sweet gum and pine trees are not wind-resistant and may fall on or otherwise damage the home. If possible, avoid positioning a home on top of a hill, in low, flood-prone places, or broadside to the most likely high wind direction (e.g., wind from open bodies of water, such as large lakes, the Gulf of Mexico, and Atlantic Ocean). You may wish to compromise ideal wind-resistant positioning for view, solar heating, air flow or layout. Even proper positioning and tie-downs will not ensure safety of your unit in high winds, so heed evacuation warnings.

Mobile homes should be anchored to withstand hurricane-force winds. Installation of mobile homes should be done by a professional. There are two types of tie-down methods. The “over-the-top” tie and the “frame” tie. The over-the-top tie keeps the unit from overturning and the frame tie prevents the unit from being blown off its supports. For maximum protection, use both over-the-top ties and frame ties to secure 10-, 12- and 14-foot-wide mobile homes. Check with local city or county officials for the exact number of ties and anchors required in your area.

Install permanent piers and footings under the supporting steel frame of your mobile home. Piers and footings should be heavy enough to anchor your home to the ground. Check the requirements for piers in your area.

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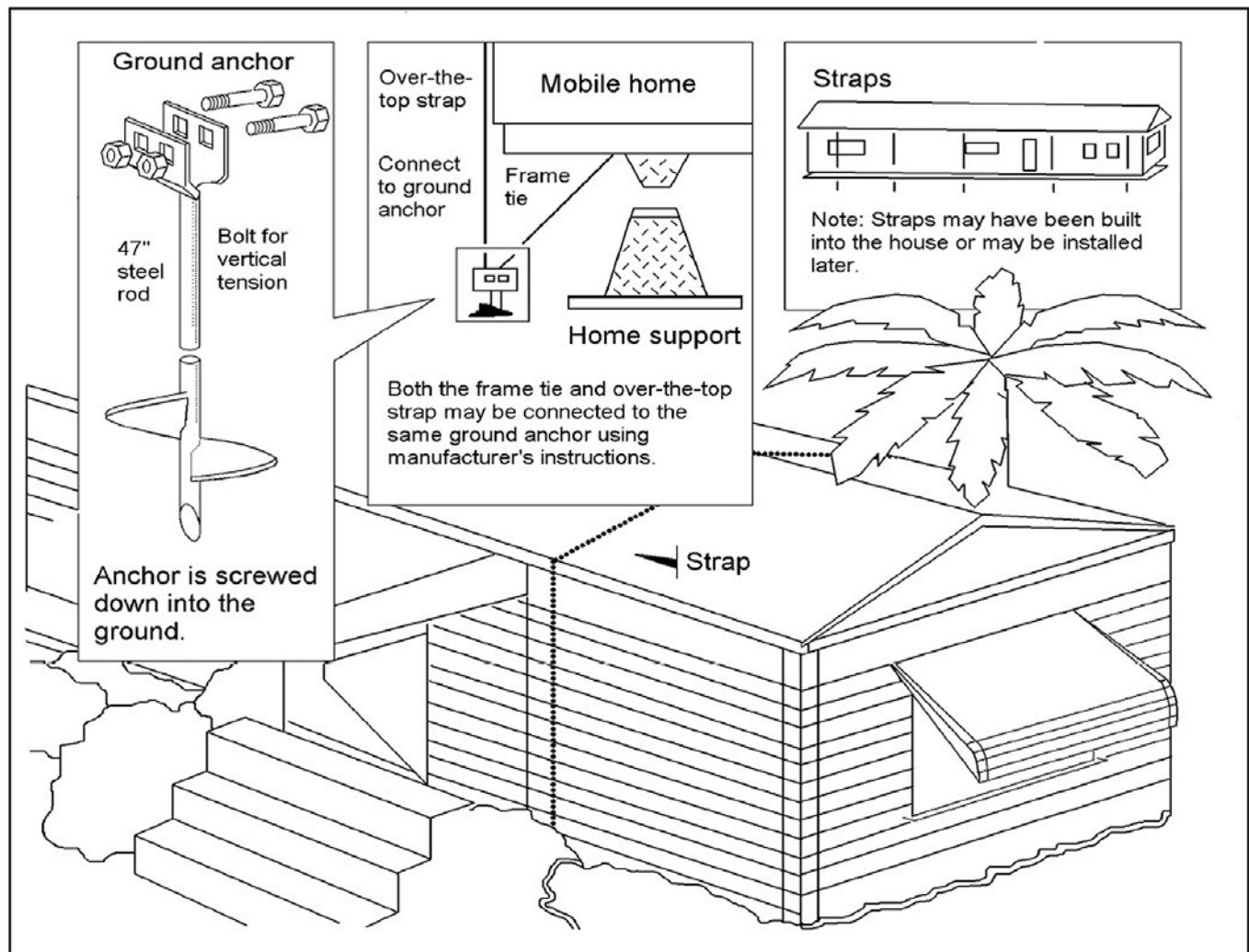
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Do not install turbine or other vents that were not installed by the manufacturer. These have not been very effective at saving energy on units with a well-insulated roof system and they will weaken the structural integrity of the unit.

To tie down a mobile home...

- Over-the-top straps keep the homes from tipping over. The straps are secured with anchors on each side.
- Frame ties made of wire rope or rust-resistant steel strapping prevent the home from tipping over. They may secure the frame, but if the home itself is not strapped down properly, the home can be blown off its tied-down frame.
- Use both over-the-top straps and frame ties to secure mobile homes 10, 12 and 14 feet wide. (Double-wides, because their width makes them more stable, usually require only frame ties.)





Evaluating Potential Storm Shelters

Coastal area populations have increased dramatically in recent decades. As a result, it is no longer possible to evacuate everyone within the hurricane warning times provided by the National Hurricane Center (typically 12 hours or less). Evacuation times can reach 20 or more hours, even for the approach of smaller hurricanes (Saffir/Simpson category 3 or lower). Residents must either leave before hurricane warnings are issued or stay behind and risk hurricane forces. Many people will choose to remain rather than evacuate.

The safety of those who stay cannot be guaranteed. Local governments can try to shelter people in buildings believed to be strong enough to withstand the storm, thereby minimizing (but not eliminating) the risk to those people. The best shelters are fully engineered and well-built structures out of the influence of flooding and waves. These may not be available. Then, the only alternative is to shelter people in the upper stories of buildings whose lower floors are subject to flooding. This is vertical evacuation.

Vertical evacuation should be used only as a last resort. This must be stressed to coastal residents. Otherwise, the designation of vertical evacuation shelters may encourage people not to evacuate.

It is important to determine, as accurately as possible, the resistance to storm forces of any building used as a shelter. If the resistance is overestimated, the building may sustain unanticipated damages, and occupants may be injured or killed. It is necessary to collect as much information about the building and site as possible, inspecting them carefully and obtaining the best available predictions of storm forces at the building site. The performance of similar structures during other storms can also provide important information.

General Evaluation Procedure for Shelters

- Identify potential shelters—This should be based on location, elevation, type of construction, etc.

■ Adapted by UF/IFAS from the Florida Sea Grant College.

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Hurricane Preparedness for Commercial-Type Buildings

The workplace is the strength of any community. It provides a wide variety of specialized services to its clientele and an economic base for its employees. The commercial sector should prepare to protect its property against the hazards generated by a hurricane.

Planning

- Review property insurance with the company's insurance agent concerning the hazards of a hurricane.
- Determine and establish written hurricane protective procedures for the business property and its contents.
- Inform key employees or essential staff of their specific responsibilities under the established hurricane procedures.
- If appropriate, establish an employee training program concerning your hurricane procedures.
- Specify conditions under which hurricane protective procedures may be implemented.
- Determine and acquire emergency protective equipment and supplies (e.g., heavy plastic sheeting, duct tape, masking tape, sandbags, emergency generator, storm shutters, chain saw, large pieces of plywood, hand tools and other essential items).
- Appoint an individual and designate an alternate to implement hurricane protective procedures.
- Establish plans for the protection of computer files (e.g., a backup system to secure data and safe storage).
- If appropriate, develop a system for the identification of employees (e.g., I.D. cards, vehicle permits, badges, etc.).
- If appropriate, inform all employees on when and how they will be notified to report back to work.

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Preparedness

- Monitor a local radio or television station for official emergency information and instructions.
- Take photographs or video of business establishment inside and out, from all angles. This will help to substantiate insurance claims later.
- Assemble insurance policies and financial records necessary to expedite quick settlement of claims; package in waterproof container.
- Make arrangements to pay employees, preferably in cash, as it may be some time before banking institutions are operational.
- Implement hurricane protective procedures as conditions warrant.

Building Exterior

- Clean drains, gutters and downspouts of the buildings.
- Remove antennas or loose objects from the roof.
- Bring in display racks and other objects usually left outside. Secure all loose objects, such as trash cans, which might cause damage during strong winds.
- Remove outdoor signs, especially those that swing or are portable.
- If building has exterior glass frontage, clear out that section of the building as much as possible and use shutters or board up to protect glass. If you have no shutters or boards, strong masking or duct tape may be used. Tape in an “X” fashion on the inside of the glass to reduce shattering.

Building Interior

- Move goods, equipment or furniture away from windows and skylights to avoid from water damage.
- Clear all desk and table tops of small loose objects.
- Take down all loosely secured pictures, plaques, etc.
- Box or place in desk drawers or storage cabinets any loose papers, books, hanging plants, etc.
- Relocate files, boxes, computers, office machines and other equipment to the innermost portion of the building or a safer location.
- Do not leave boxes or equipment on the ground floor; elevate them by placing items on desk or table tops.
- Remove contents of lower file cabinet drawers on the ground floor of the building and secure contents elsewhere.
- If time permits, make an inventory of all moved items to ease unpacking after the storm.
- Disconnect all electrical appliances and equipment, except for refrigeration.
- Cover merchandise, office machines, specialized equipment, file cabinets, copy machines, computer terminals, etc. with tarpaulins or plastic sheeting and secure with sturdy tape.
- Close all windows and draw blinds or drapes.
- Turn off the electricity except for refrigeration at the power box and lock all doors when you leave.
- Before leaving the property, recheck the securing of the outdoor objects.
- If you own equipment that could be useful after the storm, notify local emergency management officials.



Jyri Larikka

Hurricane Precautions for Swimming Pools

Before the Storm

Never completely drain your pool. You do not need to lower the water level in the pool, but if you decide to, be sure to close your skimmer valve to prevent damage to the pump when the power is turned on.

Turn off all electrical power to the swimming pool (pump, motor, lighting, chlorinators, etc.).

If your filter pump is in an unsheltered area, have the motor removed and stored; or wrap the motor with a waterproof membrane or plastic bag and tie it securely in place to prevent sand and driving water from entering the motor.

Remove all loose items from the pool area. It is not advisable to throw patio furniture or accessories into the pool. If it is necessary, however, remove them as soon as possible after the storm has passed. Heavy furniture may chip and damage the pool finish and the chemicals in the water will have an adverse effect on the furniture.

Add extra chlorine to your pool to prevent contamination. The pool provides a handy source of water for washing and flushing if your house water supply fails.

If your pool area is screened, you may prevent costly damage to the frame structure by removing 1 or 2 panels of screen above the chair rail on each side to allow the wind to blow through. Don't remove the lower panels or panels overhead. Slip the pins out of the door hinges and place the doors in a protected area.

After the Storm

Do not empty the pool. High ground water can cause structural damage to an empty pool.

Superchlorinate the pool water. When the chlorine residual returns to normal,

■ Adapted by UF/IFAS from Associated Swimming Pool Industries.

■ IFAS publication DPR-0716. Published June 1998, revised August 2005. It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For complete list of program products, visit: <disaster.ifas.ufl.edu>.

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have the water tested for proper balance. Heavy rain upsets mineral balance needed for protection of your equipment and pool finish.

Remove all debris from pool with a rake and skimmer before re-starting the system to prevent clogged lines. Some chemical feeders require special care before starting pump motor. Check with your ASPI member pool company.

Remove any wrapping around pump motor. If the motor has been submerged, it should be removed for professional cleaning and drying. If the pump has remained dry, turn on the electricity.

Check to make certain the pump is operating normally and that the water is circulating in the pool. Reset time clocks to show the correct time of day. Run the filter until the water is crystal clear and resume normal pool operation.

For further advice, call:

- Associated Swimming Pool Industries (ASPI) (305) 937-0960
- National Spa and Pool Institute (NSPI) (800) 569-6774



Jyri Larikka

Huracanes Precauciones para Piscinas

Antes de la Tormenta

No hay necesidad de bajar el nivel del agua en la piscina, excepto en casos especiales. Muchas personas se preguntan, ¿Si el agua de la piscina se desbordará, no bajará el nivel del agua de la misma? Si, puede suceder, pero no al extremo, sería lo mismo que si hubiera hierba o un patio de cemento. Nunca desagüe la piscina completamente. Si lo hace, esté seguro de cerrar la válvula del desnatador para prevenir el dañar de la bomba de agua o las cañerías.

Apague todo el sistema eléctrico que conduce a la piscina. (Motor de la bomba, luces, filtros, etc.)

Si el filtro de la bomba está en un área descubierta, muévelo y guárdelo envuelto en una bolsa de plástico y asegúrelo para prevenir arena y agua sucia entrando al motor. Amarre bien la tapa de la caja del motor.

Quite todos los objetos del área de la piscina. No es aconsejable tirar muebles de patio u otros accesorios dentro de la piscina. En caso de que sea necesario hacerlo, retírelos tan pronto hay pasado la tormenta. Equipos pesados dentro de la piscina pueden causar daño y los químicos en el agua tendrán un efecto contrario en dichos equipos.

Añada cloro extra a la piscina para evitar contaminación. El agua contenida en la piscina es un recurso a mano par lavar o descargar el baño si el suministro del agua falla.

Despues de la Tormenta

No vacíe la piscina. El agua depositada en la tierra puede causar daño a la estructura externa de una piscina vacía.

Agregue cloro extra al agua de la piscina. Remueva cualquier fibra u objeto con un colador tan pronto como sea posible. Cuando el residuo del cloro vuelva a su normalidad, haga la prueba al agua para conocer su balance.

■ Adapted by UF/IFAS from Associated Swimming Pool Industries.

■ IFAS publication DPR-0716s. Published June 1998, revised August 2005. It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For complete list of program products, visit: <disaster.ifas.ufl.edu>.

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Antes de encender nuevamente el sistema eléctrico, esté seguro de que no queden objetos dentro de la piscina. Ellos pudieran quedar atrapados dentro de la rejilla del filtro.

Peligro: Algunos químicos requieren cuidado especial antes de encender el motor de la bomba. Chequee con su compañía de piscinas (ASPI / NSPI).

Quite las envolturas del motor de la bomba. Si el motor fue sumergido en el agua, debe ser inspeccionado por personal profesional para ser limpiado y secado. Si el motor permaneció seco, encienda la electricidad.

Chequee para estar seguro que la bomba funciona normalmente y que el agua está circulando en la piscina. Actualize los relojes del sistema automático.

Haga funcionar el filtro hasta que el agua esté clara.

Para consejos, llame:

- Associated Swimming Pool Industries (ASPI) (305) 937-0960
- National Spa and Pool Institute (NSPI) (800) 569-6774



US Navy

Specific Hurricane Precautions for Marina Owners

Prior to Hurricane Season

- Contact the county Civil Defense or Emergency Management director and the Marine Patrol each spring to review comprehensive county disaster plans and to review emergency assistance communications.
- Review with your insurance representative whether vessels in wet slips should evacuate the marina; consider such factors as:
 - Severe weather drawbridge policy
 - Boat evacuation routes
 - Safe harbors
 - Boats that may be dashed against docks by wind and waves
 - Pilings that may be pulled loose as the storm tide rises
- Check with your insurance agent to confirm that:
 - The marina is adequately insured, particularly for wind and water damage
 - Current photographs of marina facilities are on file
 - Any applicable specifications required by the insurance policy have been met and that this is confirmed in writing
- Review your Storm Plan's section on severe weather standard operating procedure (SOP) at least annually — prior to hurricane season. Go over it with your staff and be sure your clientele knows what will be expected of them.
- Review your facility's "seasonal" operations or activities during the hurricane season. Consider ordering supplies, stocks and vessel inventory items accordingly to keep exposures as low as possible.
- Distribute the Storm Plan to all employees. Facility employees will have homes, family and property of their own to consider. They must be made

■ Adapted by UF/IFAS from Lee County, Florida Emergency Management.

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aware of their work-related duties and responsibilities so that they can plan accordingly. Review plans and procedures with co-tenants or subcontractors in multiple-occupancy facilities.

- Develop a detailed map of the marina/boatyard complex showing locations of:
 - Utility equipment and power shutoff points
 - Sources of auxiliary power
 - Potential hazard areas, such as fallen objects, trees, poles, etc.
 - Emergency equipment and supplies
 - Communication equipment
 - First aid stations
 - Escape routes
 - Stored hazardous materials
- Know your physical plant facilities, operations services, equipment and housekeeping. Make assignments of employees to be responsible for areas and operations of the facility. Designate team units to be responsible to key people.
- Conduct a complete facility housekeeping and field-day or field-week operation sometime in the spring or just prior to the hurricane season, to police and clean up all open areas and structures within the facility. This should include, but is not limited to, the following:
 - Remove all debris, trash and unnecessary items from open areas.
 - Store or otherwise secure all materials and supplies.
 - Inspect and service as necessary all building walls, roofs, windows, doors, docks, piers, wharfing or slipfingers, pilings, electrical and lighting installations, fuel and natural gas supply and dispersing equipment, both portable and fixed fire fighting equipment, mobile lifts, hydrolifts and railways.
 - Conduct and record frequent safety inspections of the entire marina/boatyard facility with your insurance agent. Correct problems immediately.
 - Prepare and maintain a disaster preparedness kit (DPK).
- Purchase, maintain and monitor a battery-operated NOAA weather-alert radio and a portable AM-FM radio for local government advisories (models that require no batteries are available). Make sure that you and your employees understand the local warning system. Order and stock as needed emergency equipment and supplies. Develop your stock according to what your facility needs, such as extra mooring lines, lumber for fender boards, chafing gear, screw anchors, flashlights, batteries, portable generators, electrical and manual bilge pumps and hull patching or repair supplies.
- Estimate the number of permanent, transient, new or brokered vessels that may be on hand in your care, custody and control at any period of time during the hurricane season. Can you secure all vessels at your facility, or will vessels have to be moved to inland protected areas? How and by whom? Where? These questions are best answered long before a storm hits.
- Determine your policy on non-owned vessels in your care, custody and control at your facility and elsewhere. Communicate your position to vessel owners, preferably in written form as a notice, or as part of the mooring, listing or work order agreement or contract.
- Know all the vessels and their owners, captains or caretakers. You should have a record of home and business phone numbers and addresses of vessel owners or their designated representatives. Consider having vessel owners file written hurricane plans with you. Plan a communication system with wet slip

clientele, including the name, address, and telephone number of a designated caretaker in the event the client is out of town during the hurricane season.

- Make sure that dockage space rental agreements and storage contracts limit liability for property damage and personal injury. Specify that vessel owners will be billed for services and materials necessary for preparation, response and recovery. If evacuation of vessels is required, make sure all clients understand your policies and the measures being taken.

Standard Operating Procedures (SOP)

Development Guidelines

The SOP is a checklist of specific tasks and duties arranged in order of importance. Organize the SOP according to the predicted time of arrival for severe weather. For example, at minus 72 hours, all personnel and clientele should be alerted. The SOP should define when and under what conditions you plan to begin response actions.

Establish procedures for communicating with and assisting clientele in preparing, responding and recovering from severe weather. For example, this might consist of:

- Listing calls to be made
- Distributing a written checklist of tasks for clientele to use in preparing their vessels
- Assigning staff members to provide materials and assistance when needed

Outline specific tasks for each department or staff member to accomplish during preparation, response and recovery. Establish responsibility for:

- Boarding the windows, operating emergency pumps, supervising traffic, preparing special equipment such as pumpout stations, generators, DPK, etc.
- Deciding what equipment, files and personnel are to be evacuated, in what order, when and how
- Deciding where equipment and supplies are to be sorted and secured, etc.

Include lists of files, documents, photographs, equipment, etc. requiring special attention. For example, staff assignments, evacuation routes, clientele and staff evacuation deadlines and final inspection before leaving, recovery safety inspection, and guidelines and methods for logging arrivals and departures.

Disaster Preparedness Kit (DPK)

Recommended Equipment and Supplies

Disaster preparedness kits are a collection of equipment and supplies which can be made immediately available to staff and/or clients to prepare for and recover from the effects of a disaster. Purchase materials well in advance; properly store and maintain at all times. The following is offered as a guideline for assembling kits.

- Items needed by personnel and clients: first aid kits, medicine, stretchers, blankets, food and water, radios, batteries and flashlights, life jackets, foul weather gear, flares, tools, sanitation facilities, gas-powered generators, pumps, hoses, etc.

- Items needed to secure facility: plywood, nails, duct tape, extra line and cable, auxiliary power, fuel, fire control equipment, tools, emergency lighting, sandbags, barricades, warning signs, chafing gear, used tires, etc.
- Items needed for evacuation: SOP, including legal documents and photographs, personal effects, extra food and water, medicine, clothing, portable radio, special tools needed for recovery, a trailer or truck to haul heavy items, keys, etc.

Prior to the Hurricane

Even the smallest marine facility operation has numerous tasks and precautions that must be taken in preparation for a hurricane. The extent of the tasks and the number of personnel available will determine the amount of time required to complete the preparation. However, 72 hours is probably the minimal time allowable in most instances to undertake the following:

72–48 Hours prior to Predicted Hurricane Landfall

- Be alert to NOAA weather updates and local official advisories. Take appropriate actions based on the proximity and predicted movement of severe weather.
- Notify personnel that the facility is on a hurricane alert. Personnel should commence preparations for putting the hurricane plan into action.
- Review the standard operating procedure. Check the disaster preparedness kit. Allow staff to prepare their homes before reporting for duty. Do not forget the live-aboards.
- Implement severe weather standard operating procedure. Put waterborne operations employees on standby to start securing operations within the next 24 hours. Begin contacting vessel owners or their representatives in order to remove vessels from the facility, if required. Begin facility protection preparations by policing all yards, marina and dock areas. Stow away or secure loose equipment.
- Remove vessels from dry storage or other facilities with outside racks for small boats and trailers and secure them elsewhere. Use facilities with inside rack storage in a building with sufficient protection, unless in a lowland area where evacuation of all vessels may be necessary. Secure all flammable, explosive or other hazardous materials, such as compressed gas cylinders, in a safe, protected, secure area.
- Take down large signs, antennas or other removable items subject to wind damage. Commence facility protection precautions at this time. Install storm shutters or other protective equipment.
- Process and mail all paperwork that can be completed immediately. Set all new paperwork aside to be completed after the hurricane. Reduce inventories as much as possible and delay ordering materials, stocks or supplies.
- Have all dumpsters emptied.
- Top off all underground fuel tanks.
- Top off all above-ground fuel tanks and double the tie-downs.
- Prepare to evacuate. Base the decision to evacuate on recommendations from local authorities and the condition of evacuation routes. Account for all personnel and clientele. Arrange for transportation. (Rent necessary vehicles/equipment early.) Remove expensive equipment or products to inland warehouses for storage.

48–24 Hours prior to Predicted Hurricane Landfall

- Complete all vessel removal operations during this 24 hour period. Secure remaining vessels. Fuel all the departing vessels as well as facility vessels and other vehicles in preparation for securing all fueling operations and equipment. Loss of electrical power during a hurricane may disrupt fuel supplies after the storm.
- Secure in protected areas any equipment such as forklifts, trucks, travel lifts, mobile cranes and workboats that may not be needed in storm preparations. Complete securing operations for lowland locations that are evacuating personnel and equipment.
- Secure all dock structures, field buildings and offices. Evacuate trailers.

24–0 Hours prior to Predicted Hurricane Landfall

In these hours prior to the projected arrival of the hurricane, the Hurricane Warning has been issued. It is highly likely that the hurricane will make landfall near your facility. The following activities should be in progress or nearing completion so that most personnel can be released in the next twelve hours:

- Complete all vessel protection and securing operations with a final check of doubled mooring lines, tied off with sufficient slack and fender boards and/or other protective equipment in place.
- Turn off all electrical power supplies at the main power switch. Turn off all natural gas at the main valve. Secure all fuel supply tanks and lines at the shoreside installation. Disconnect all electric motors, pumps and similar equipment at or below ground level and protect or place in a safe location.
- Evacuate clientele, essential files, records, equipment and personnel either when the premises are secured or immediately upon hearing an evacuation order from authorities.
- Release employees who are not staffing facilities during the storm no later than twelve hours prior to the storm. Give instructions for reporting back to work after the storm.
- Ensure that all perimeter access points in the form of fences, gates and building doors are locked and secured.
- Complete all facility precautionary preparations twelve hours prior to the hurricane's arrival.
- Do not allow employees to stay on any vessel during the hurricane.
- Turn off fresh water supply at the meter if supplied from city water lines.

During the Hurricane

- Stay in a protected and safe place inland if possible.
- Exercise extreme caution if outdoor activities become necessary. Do not attempt to move or re-secure loose vessels or equipment during the storm period. Do not venture out during the eye or lull in the hurricane.
- Stay tuned to news and weather broadcasts concerning the hurricane's movement so you will know when the danger has passed.





Hurricane Preparedness for Boat Owners

The key to protecting your boat from hurricanes or any threatening severe weather is planning, preparation and timely action. If a boat causes damage during a natural disaster, the boat owner/operator may be held responsible. Normally the National Weather Service will issue a 24-hour warning; however, in some instances only a 12-hour warning will be given. Upon receiving this warning the boat owner/operator should immediately take precautionary measures to see that his/her boat is properly secured.

Each boat owner needs a plan unique to the type of boat, the local boating environment, the severe weather conditions and the characteristics of safe havens and/or plans for protection. The following preparation and precautionary suggestions are issued as guidelines to be used by the marine community. The following precautions and checklists are meant as guides only. It is stressed that following these guidelines does not necessarily exempt the owner/operator from being held responsible should his boat cause damage to another's property; nor will acquisition of required safety equipment and following the suggested safety procedures necessarily assure that no damage will occur to the boat.

General Precautions

Prior to the hurricane season, develop a detailed plan of action to secure your vessel in the marina, if permitted, to remove your boat from the threatened area, or to take your boat to a previously identified hurricane refuge. Specifically identify and assemble needed equipment and supplies.

Hurricane moorings should be located in advance. Permission should be obtained from appropriate persons. For keel boats, make certain there is enough water at low tide.

A practice run should be made to check accessibility, depth of water, bridges, location of aids and/or obstructions to navigation and locations to secure lines or drop anchors. According to a Florida statute beginning in 1993, drawbridges will not open for boats during evacuation procedures.

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Before a hurricane threatens, plan how you will remove valuable equipment from the boat. Determine how long it will take so you will have an accurate estimate of the time and work involved. After you have made anchoring or mooring provisions, remove all movable equipment such as canvas, sails, dinghies, radios, cushions, biminis and roller furling sails. Lash down everything you cannot remove, such as tillers, wheels, booms, etc. Seal all openings (use duct tape) to make the boat as watertight as possible. Make sure the electrical system is off unless you plan to leave the boat in the water. If the boat is not to remain in the water, remove the battery to eliminate the risk of fire or other damage.

Arrange for a reliable person to learn and carry out your hurricane plan if you are out of town during a hurricane or severe storm. Check your lease or rental agreement with the marina or storage area. Know your responsibilities and liabilities as well as those of the marina or storage area.

Consolidate all documents including insurance policies, a recent photograph or video tape of your vessel, boat registration, equipment inventory, lease agreement with the marina or storage area, and telephone numbers of appropriate authorities, such as the harbor master, Coast Guard, insurance agent, National Weather Service, etc. Keep the documents in your possession in a locked water-proof box. They may be needed when you return to check on your boat after the hurricane.

Maintain an inventory list of both the items removed and those left on board. Items of value should be marked so that they can be readily identified.

Trailerable Boats

Determine the requirement to load and haul your boat to a safer area. Be sure your tow vehicle is capable of properly moving the boat. Check the condition of your trailer; tires, bearings and axle. Too often a flat tire, frozen bearings or broken axle prevents an owner from moving a boat.

Once at a safe place, lash your boat to the trailer and place blocks between the frame members and the axle inside each wheel. Owners of lightweight boats may wish to consider letting out about half the air in the tires, then filling the boat one-third full of water to help hold it down. (The blocks will prevent damage to the springs from the additional weight of the water.) Consult with the manufacturer for the best procedure for your lightweight boat.

Secure your boat with heavy lines to fixed objects. Because hurricane winds rotate and change direction, try to pick a location that allows you to secure the boat from four directions. It can be tied down to screw anchors secured in the ground.

Non-Trailerable Boats in Dry Storage

Determine the safest obtainable haven for your boat and make arrangements to move your boat there. When selecting a safe location, be sure to consider whether storm surge could rise into the area. Wherever you choose to locate your boat for the duration of the hurricane, lash the boat to its cradle with heavy lines. Based on the weight of the boat, consider adding water to the bilge to help hold it down. Never leave a boat in davits or on a hydro-lift.

Non-Trailerable Boats in Wet Storage

The owner of a large boat, usually one moored in a berth, has three options. Each action requires a separate strategy. Another alternative, running from the storm, is not encouraged except for large commercial vessels.

- Secure the boat in the marina berth.

- Moor the boat in a previously identified safe area.
- Haul the boat.

Boats Remaining in Marina Berth

Double all lines. Rig crossing spring lines fore and aft. Attach lines high on pilings to allow for tidal rise or surge. Make sure lines will not slip off pilings. Inspect pilings and choose those that seem strongest and tallest and are properly installed. All storm lines should be at least one size larger than regular lines.

Cover all lines at rough points to prevent chafing. Wrap with tape, rags, rubber hoses, etc. Install fenders to protect the boat from rubbing against the pier, pilings and other boats.

Assess the attachment of primary cleats, winches and chocks. These should have substantial back plates and adequately sized stainless steel bolts.

Batteries should be fully charged and checked to ensure their capability to run automatic bilge pumps for the duration of the storm. Consider backup batteries. Turn off all other devices consuming electricity.

Do not stay aboard. First and foremost, safeguard human life. Winds during any hurricane can exceed 100 mph, and tornadoes are often associated with these storms. In addition, when winds and seas warrant, marine agencies remove their boats from service and will be unavailable to rescue foolish boaters.

Prior to the Hurricane Season

Make sure your vessel is in sound condition. This includes the hull, deck hardware, rigging, ground tackle, machinery and electronics. Absentee owners should arrange for a boatyard haulout or a supervised inspection of the vessel prior to, and in preparation for, the hurricane season. Make sure batteries are charged, bilge pumps are operable and all equipment is secured.

Inspect the vessel's deck hardware in light of planned mooring arrangements. Assess the size and structural attachment of the primary chocks, cleats, bitts, bollards and winches. These high load/high stress points should have substantial backing plates and be secured with bolts of adequate size.

Avoid chafing of mooring lines. Chafing gear that has been proven successful is a double neoprene hose arrangement. Storm moorings, whether at dock or otherwise, should have doubled lines. The second set of lines should be a size larger than the normal lines, including spring lines at a dock.

Purchase necessary materials ahead of time, such as additional lengths of mooring lines, screw anchors, fenders, fender boards, chafing gear and anchors. These items may not be readily available during the hurricane season or just prior to a hurricane.

If the vessel is to be unattended during the hurricane season, make arrangements for the vessel to be hauled to a storage yard on its trailer, if trailerable. Arrangements for wet storage at a protected dock, mooring or marina is another alternative.

Make up an inventory of all vessel equipment. Note items to be removed from the vessel. Take photographs or videotapes of your vessel. Keep a copy of these documents on board and ashore in a safety deposit box or a locked water-proof box.

For wet berthing locations, ensure that seawalls and docks are sound, mooring bitts and cleats are secure, and that dock pilings and dolphins are in good condition. At private berthing and dock facilities in residential areas, check with neighbors and other vessel owners in the area. Coordinate safety and mooring arrangement plans. At marina facilities find out from the dock master or marina management personnel what their hurricane plans and/or procedures are in regard to vessels left at the facility.

Check with local marine and law enforcement organizations for local plans. This is especially important in boating centers of south Florida where access to inland protected rivers and canals is limited by bridges that may be permanently closed for land evacuation routes when a hurricane warning is issued.

If your plan calls for moving your vessel from its current berthing location to an inland waterway location, know your route, your vessel navigation requirements at different tides and the restrictions along the route such as bridges (auto and train) and channels. This is especially important for sailboats or large vessels.

Rehearse your planned vessel movement, including an actual visit to the alternate dock or hurricane mooring/anchoring location. If rental of a protected dock or slip space is required, make arrangements well ahead of time. Be sure that family or key crew members know your hurricane plan or arrangements and how to contact you or your designated representative or agent.

Hinge your plan on quick response. Moving a vessel, stripping sails and derigging, and anchoring in seas resulting from 35 mph winds is extremely difficult—impossible in 45 mph winds. Prepare your hurricane plan in writing and make copies of it. Keep a copy on the vessel and at home. Extra copies should also be made for marina or yacht club facilities which may require you to have one on file with them.

Make sure your insurance policy is current. Read the policy thoroughly. Your policy may contain helpful information relative to what the vessel owner should and should not do if there is storm or hurricane related loss or damage to the vessel. Understand the coverages, exclusions and your duties as a vessel owner.

Prior to the Hurricane

If your plan calls for moving your vessel, move it at least 48 to 72 hours before the hurricane is estimated to strike the area. This may be before a hurricane watch is issued. Make sure that:

- Fuel tanks are full.
- Fuel filters are clean.
- Batteries are charged.
- Bilges are clean.
- Cockpit drains are free and clear.
- Fire fighting equipment is in good order.
- Lifesaving equipment is in good condition, in place and readily accessible (these items will be secured later).

Remove and/or secure all deck gear, portable gear, radio antennas, outriggers, fighting chairs, deck boxes, bimini tops and side canvas/curtains, sails, booms, dorades, extra halyards, canister rafts, and dinghies. Make sure that you secure all hatches, ports, doors, lazarettes and sailboat rudders. (The dinghy may be required to take lines ashore.)

Enhance the watertight integrity of your boat, both above and below the water line. Seal windows, doors and hatches, if necessary, with duct tape. Shut sea cocks and cap off or plug unvalved through-hull fittings, such as sink drains.

If your vessel is moored at a dock on a canal, river, or in a marina near the ocean, it is possible that with an additional 5- to 10-foot or greater storm surge the vessel could take a beating against the dock or even impale itself on the pilings. The best offshore mooring location for a vessel to ride out a storm is in the center of a canal or narrow river where at least doubled mooring lines can be secured to both shores, port and starboard, fore and aft. Do not raft vessels together at moorings or docks, especially if larger and smaller vessels are involved. The probability of damage to the vessels is greater than if they are moored separately.

If the vessel must remain dockside at a private dock or marina, heavy duty fender boards (2x6) should be installed on a bare wood center piling to prevent damage. Lines should be doubled and even tripled where necessary to hold a vessel in the center of a berth or off seawall or dock pilings. Preventers should be installed at the top of the pilings so lines cannot slip off the top. Note that nylon line will stretch five to ten percent of its length.

During the Hurricane

Do not stay aboard any vessel during a hurricane. If you have taken all the preliminary precautions previously outlined, you have done all that can be done in anticipation of the storm. Stay in a protected and safe place. Attend to the safety of family, home and other personal property. Stay tuned to news broadcasts and weather advisories concerning the hurricane so that you will know when the danger has passed.





Protecting Your Boat in a Hurricane

Make preparations for your boat early!

■ Adapted by UF/IFAS from: *Personal Hurricane Survival Guide* (Martin County Public Safety and Chris Procise, Martin County Cooperative Extension Service)

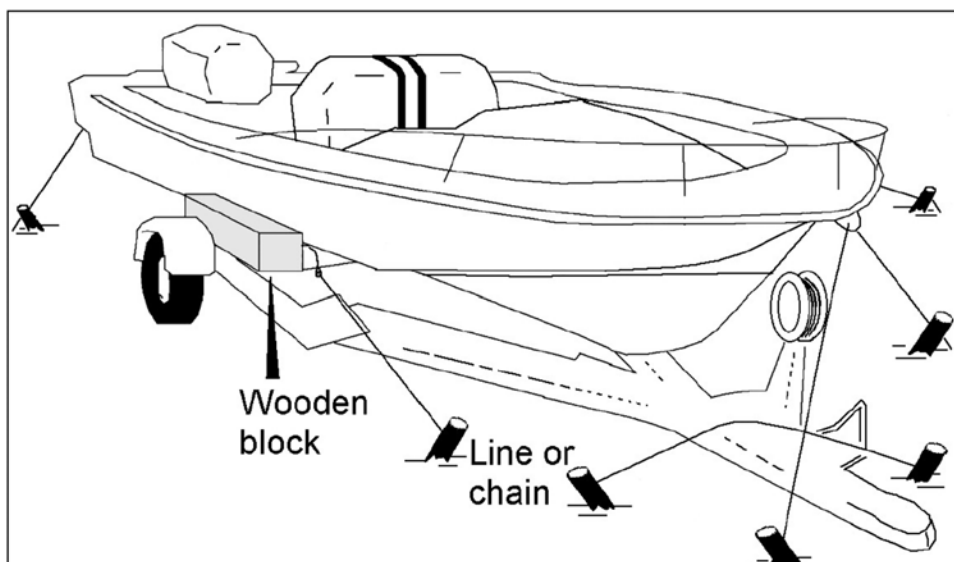
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Tying Down Your Boat at Home

- If you can, put the boat in a garage.
- If you must leave the boat outside, remove outboard motors.
- Lash down the boat.
- Fill the boat one-third to half-way with water (filling all the way could break the trailer springs or axle.).
- Support the axle with blocks inside each wheel. Remove any item that could blow off the boat.
- Place the boat away from trees or objects that could fall on it.

Tying Down Your Boat at a Marina or Dock

- Double all ties. All lines used for the storm should be at least one size larger than the normal lines.
- Make ties high on pilings to allow for rising water.
- Cover all tie lines at contact points with rubber or other material to prevent chafing.
- Install fenders to protect the boat from rubbing against the dock.
- Be sure batteries are sufficient to run bilge pumps throughout the storm.
- Put duct tape on windows and hatches.
- Insert plugs in engine ports.
- Strip Bimini tops, sails, life rings—anything that could blow away.
- Disconnect shore power.
- Close fuel valves and cockpit seacocks.

Finding Safe Harbor

- If the boat cannot be removed from the water, it should be sailed to a safe refuge and secured there to ride out the storm.
- Many marinas must be evacuated during a hurricane alert. Check your dockage lease and consult the dockmaster.
- Canals leading inland offer varying degrees of protection for boats. Some east-west waterways are blocked at some point by floodgates, limiting their usefulness.
- Consult the dockmaster and fellow boaters for suggestions.
- Drawbridges limit movement of large vessels, and ground traffic will get priority in an evacuation. Boat owners should act ahead of an evacuation order.
- If you decide to move your boat inland make a test run to ensure that the water is deep enough and overhead clearances are high enough.



Lucas Equine Equipment

Protecting Farm Buildings from Storm Winds

High winds can damage farm buildings. The following procedures are recommended to help protect buildings during hurricanes or other severe windstorms:

- Securely close all doors and windows. Try to determine whether the buffeting and force of the wind will break fasteners or hinges. Nail doors and windows shut, if necessary.
- Nail plywood or boards over large windows and windows with weak sashes.
- Brace large barn doors and weak walls. As the hurricane passes, the wind direction will change, therefore, use both interior and exterior braces. Place braces on the reinforced section of the door or wall to distribute the bracing effect over a larger area.
- Check that roof rafters are securely fastened to the wall studding. Use hurricane-rated straps or 2" x 6" knee braces to secure rafters, if necessary.
- Check metal roofing and siding for loose nails. If nails don't tighten when hammered back in, pull them out, use a #12 or #14 metal screw to fill the hole, and renail 2 to 4 inches away; eaves should be nailed every 5 inches.
- Do not use heavy machinery to anchor small buildings. Replacing machinery could be more expensive than replacing a building.

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Protecting Livestock during a Hurricane

■ IFAS publication DPR-0721. Published June 1998, reviewed April 2004. (Formerly DH-033). It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For a list of program products, visit: <disaster.ifas.ufl.edu>.

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- When the forces of a hurricane cause flooded conditions, livestock that are not in a confined area can usually take care of themselves. Do not, however, let them become trapped in low-lying pens.
- In broad, level flood plains where flood waters are seldom deeper than 3 or 4 feet, construct mounds of soil on which livestock can stay until flood waters recede. Construct mounds from bales of hay for hogs to climb on. Try to build these mounds where they will not be washed away by fast-flowing water.
- Provide feed and water for the livestock. Water is essential. Thirsty animals will try to break out to get to flood waters. If water is in short supply, limit the livestock's feed intake.
- If animals are housed with machinery, fasten bales of straw in front of sharp edges and protruding parts such as cutter bars or crank handles. Do not use hay because animals will eat it. Try to cover wooden paddle wheels on combines or choppers since these parts can be dangerous if partially broken.
- Block off narrow passageways where animals would be unable to turn around. A few heavy animals in a narrow dead end can be dangerous not only to themselves but also to the buildings in which they are housed.
- Make provisions to block livestock from any access to herbicides, pesticides and treated seeds. Store such chemicals and seeds where flood waters will not contaminate livestock feed or water.
- Turn off electricity at the main switch. Livestock could damage electric fixtures, causing fires or electrocutions.
- If dairy barns may become flooded, drive cattle out of the barn. During the rapid rise of water, cattle often refuse to leave a barn and may drown if the water rises high enough in the barn.





USDA/NRCS

Protecting Dairy Cattle during a Hurricane

Food and Water

Hurricanes cause abrupt changes in the environment for cattle, sometimes resulting in a lack of feed and water. Water for cattle is essential, particularly in hot weather. A cow's daily water intake will increase as much as 100% in high temperatures.

The threat of a hurricane might even require livestock to be moved to a different environment. Remember, cattle must have access to grass pasture. If finding a secure location with access to pasture is impossible, you must bring in hay for the cattle to eat.

■ IFAS publication DPR-0722. Published June 1998, reviewed April 2004 by Dana Zimmer, associate professor, College of Veterinary Medicine. (Formerly DH-034.) It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For complete list of program products, visit: <disaster.ifas.ufl.edu>.

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Cows

Avoid using grain or concentrate feed because this creates complications such as grain overload, bloat and lactic acidosis. Under hurricane conditions, cattle can be maintained on grass and hay only.

Calves

Calves less than 8 to 10 weeks of age will require milk or milk replacer fed at least once daily. Most cattle will not nurse calves unless the calf has been with the cow since birth. Since the dairy calves have usually been separated at a very early age from their mothers, relief workers will be challenged by the labor-intensive process of feeding milk to dairy calves.

Shelter

Florida's subtropical climate can be particularly stressful to cattle, whose comfort is best when temperatures range between 41 to 78°F. The combination of solar radiation, elevated ambient air temperature and high humidity can be life threatening. To relieve the heat stress, the following procedures are suggested:

- Provide access to shade, such as trees or portable structures.

- Temporarily allow access to ponds or standing water so that cows may cool off.

Emergency Medical Care

Having proper supplies available will facilitate emergency medical care and management of your cattle. You will need horses and riders to round up stray cattle, as well as restraint equipment:

- Portable chutes and corrals
- Lariats
- Rope halters

Veterinary assistance will most likely be required for trauma cases and other problems. Depending upon the severity of the medical situation, euthanasia may be the most humane treatment option. Because controlled substances may be required to euthanize, plan carefully and consult your veterinarian.

Milking Procedures

Depending upon local conditions and facility damage caused by the hurricane, it may not be possible to continue milking. Although this results in some discomfort to the cow, it is not life threatening. To discontinue milking, however, can predispose cows to mastitis. Mastitis must be handled individually.

Prolonged discontinued milking (several days to more than a week), along with lack of feed and water will cause the udder to cease producing milk.

Using portable milking facilities operated by generators to milk a limited number of animals is a feasible method to prevent mastitis and to preserve the udder's milk production. Another option is moving the lactating cattle to other farms or facilities.

In the worst of conditions, you may decide to dry all cows off and not try to milk them. In this case, administer dry treatment to all quarters of all cows.



Emergency Treatment and Management of Horses under Hurricane Conditions

The horse population is often at greater risk for traumatic injury than the human population when natural disasters strike because of the conditions under which horses are normally maintained. Stabling may be destroyed or horses may escape from their normal confinements, resulting in traumatic injury.

When these emergency situations arise, veterinarians unfamiliar with equine practice may be requested to assist with the capture and emergency treatment of horses. These guidelines are designed to serve as a quick reference for those veterinarians.

Containment

Frequently, free-running horses will be found in groups because horses are herd animals by nature. This can complicate the capture process, often necessitating that a corral or other fenced enclosure be constructed into which the animals can be either driven or enticed with feed. Occasionally individual animals within the group can be caught and led to the stabling facility, followed by other more fractious members of the group.

Horses that cannot be caught may have to be sedated with intramuscular tranquilizers administered with a dart gun. Most city and county animal control departments will have dart guns available for such purposes. After capture any intact male animals (other than unweaned foals) should be separated from the group. Anyone handling a tranquilized horse should always remain alert. A horse's "fight or flight" reaction may cause it to "fight" the tranquilizer if frightened enough. All it takes is a split second for a horse to kick out in fear and injure an unwary handler.

Horses with EIA (equine infectious anemia) identification should be quarantined at least 400 yards from other horses until they can be reunited with other quarantined EIA horses.

■ IFAS publication DPR-0723. Published June 1998, reviewed April 2004 by Dana Zimmel, associate professor, UF College of Veterinary Medicine, and Mark Shuffit, Marion County, Florida extension agent. (Formerly DH-035.) It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For complete list of program products, visit: <disaster.ifas.ufl.edu>.

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Housing and Feeding

A stall for each individual animal would be the optimal housing situation; however, such conditions rarely exist in the aftermath of a hurricane. Pens must be constructed from available materials.

Safe fences can be constructed from electrical fencing using thin gauge smooth wire and a battery-powered electrical source. Non-electric smooth wire or board fence is also acceptable and may be produced from available materials. If wire fencing is used, light-colored strips of cloth should be tied along the individual wire strands at 4 to 6 foot intervals to allow better demarcation of the fence.

Remember, the smaller the group, the more manageable individual animals will be. The horses should be closely observed immediately after being confined. Individual animals with aggressive behavior should be noted, and placed in a separate corral or with a different group of horses. Severely injured horses should be provided with an individual stall if possible. Most stallions will need to be provided with an individual stall or pen. Additionally, stallions that must be placed in pens or stalls located immediately next to mares will need to be separated by a solid barrier. If a stallion must be housed anywhere near mares, a menthol ointment, such as Vick's VapoRub, may be liberally applied to the stallion's nostrils often. This may help to keep him from smelling the mares.

When horses are stabled in large groups, certain animals may become territorial, denying others access to feed or water if only one source is available. At least two water sources and several feed sources should be made available in every corral containing multiple horses.

The horses' diet will depend upon the availability of feed in the area following the disaster. The feedstuff of choice would be a grass hay such as timothy, fed at 10 lb of hay per 450 kg of bodyweight or equivalent to approximately one fifth of a bale/horse/day. (Use grasses such as coastal bermudagrass pangola only if no other grass is available.) Unless there are juvenile animals, lactating mares or severely underweight animals, do not feed grain; it may predispose the horses to laminitis and/or colic.

Animal Identification

Every horse brought into a central holding facility should be checked to see if it carries some form of permanent identification such as a brand or tattoo. Brands may be located anywhere on the horse; however, certain breeds of horses such as Arabians may be branded underneath their mane. Horses which have been on the race track will have a tattoo on the inside of their upper lip. Those without such identification should have a number clipped into their hair.

A Polaroid picture of each animal with a matching identification number should be kept on file; close-up photographs of any wound or other disaster-related injuries should be taken as well as one showing the entire animal.

Management of Traumatic Injuries

Any horse with an injury that has broken the skin should be given a tetanus toxoid injection. Superficial traumatic injuries respond well to cleansing with a mild disinfectant such as dilute povidone iodine solution and application of a topical antibiotic dressing.

Wounds heal with less exuberant granulation tissue if left unbandaged, unless they are located in an area

of excessive motion or tension. Deeper wounds and puncture wounds should be explored to determine the extent of the wound and to make sure there is not a foreign body present.

The vascular integrity of the wound area should be evaluated. A loss of local blood supply may impede healing and predispose the wound to infection. The wound should be lavaged with a sterile saline or dilute povidone iodine solution daily until filled with granulation tissue. The wound should be cleaned twice a day with hydrotherapy followed by lavage with sterile saline.

If a fracture is suspected, the joint above and below the fracture should be immobilized as well as possible with a Robert-Jones bandage until radiographs can be obtained. A support wrap should be applied to the opposite limb. Accurate records of all medical treatments and surgical manipulations should be kept.

Medication Doses

Antibiotics

- Procaine G Penicillin: 25,000 to 40,000 IU/kg IM, BID or SID
- Trimethoprim-sulfa: 20 to 30 mg/kg PO, BID
- Gentamicin: 6.6 mg/kg, IV or IM d 24 hrs
- Metronidazole: 15 mg/kg PO, TID
- Ceftiofur: 2.2 to 4.4 mg/kg IM or IV, BID

Sedatives

- Xylazine: 0.25 to 1.0 mg/kg IV or IM
- Detomidine: 0.01 to 0.02 mg/kg IV or IM
- Butorphanol: 0.01 to 0.03 mg/kg IV or 0.03 to 0.1 mg/kg IM
- Acepromazine: 0.02 to 0.06 mg/kg IV or IM
- Ketamine: 2.2 mg/kg IV after xylazine (for anesthesia)

Anti-inflammatory drugs

- Phenylbutazone: 2.2 to 4.4 mg/kg PO or IV, BID or SID
- Flunixin meglumine: 0.25 to 1.0 mg/kg IV or IM, SID or BID
- Dexamethasone: 0.02 to 0.2 mg/kg IM or IV or PO, SID
- DMSO: 0.5 to 1.0 mg/kg as a 10% soln IV, BID

Miscellaneous

- Furosemide: 1 to 3 mg/kg IV or IM, SID or BID (Administer to horses that have never been vaccinated for tetanus.)
- Tetanus antitoxin: 1500 units IM
- Tetanus toxoid: 1 ml IM
- Pentobarbital (Beuthanasia-D): 1 ml for each 10 lbs body weight IV for euthanasia





Halalmeats, Inc.

Emergency Preparedness for Small Ruminants

When fences are down after a hurricane, uncontrolled sheep, goats, llamas, and alpacas are at risk from dogs, wild predators, moving vehicles and malicious people. In their search for food and disorientation, these small ruminants can also interfere with post-hurricane public and vehicular transportation.

Immediately after the Hurricane

Immediately after the storm, you will begin the process of gathering animals that have scattered. Hopefully, you made plans for this before the hurricane, and gained permission from authorities to use a local area with a solid perimeter fence, such a soccer field, softball field, tennis court, etc. If not, the first order of business is to repair fencing or establish temporary fencing with livestock panels or other suitable material to contain small ruminants. You may have to improvise a pen from whatever materials you may have on hand. If you have goats on the loose, you need a rigid fence instead of flexible plastic barrier materials.

Avoid enclosing areas around landscaped yards, since many ornamental plants are toxic to livestock.

If needed, build temporary enclosures around trees or small buildings with a fence, so livestock can have some shelter. Llamas and alpacas can get overheated without shade. You can provide shade by parking a semi-trailer (18-wheeler) in the fenced enclosure where livestock can get out of the sun by getting below the trailer, which could double as a bedding area as well as protect weaned animals from rain or full sun.

Make sure that you have a five-gallon bucket or similar container with which you can provide fresh water daily.

■ IFAS publication DPR-0724. Published June 1998, reviewed April 2004 by Jacque Breman, Union County Extension Director. (Formerly DH-036.) It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For a list of products, visit: <disaster.ifas.ufl.edu>.

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Plan enough bedding area. Sheep and goats need two square yards of space per animal; llamas and alpacas need about five square yards per animal.

Plan enough grassy area for grazing during the day since hay supplies may not be available for weeks after a hurricane. Five sheep, goats or alpacas can be maintained on one acre of grassy area during the grass's growing season. Llamas need twice the amount of grazing area. Hurricanes normally arrive in the fall, so grazing may be limited. Before a hurricane, it is a good idea to buy feed and supplemental hay for a potential emergency. Having several bags of feed grain on hand will help to gather wandering, uncontrolled animals and supplement grazing until hay supplies are available.

Directed Movement

The next step is to use the animals' flocking instinct to gather groups for control behind fencing. Don't worry about sorting animals until you have them all gathered and controlled. Sheep and goats regroup quickly with the same species or pen mates. Llamas and alpacas will group together with the llamas dominating.

Regularly fed animals will follow a feed bucket with grain. Use this strategy to get the dominant animals to follow you into the fenced enclosure by holding the feed bucket up and shaking it. If animals have been without feed for a while, they may try to rush the feed bucket, so be prepared to move quickly so they will follow you instead of running you over. Male llamas may present a challenge, since they place themselves in front of their flock to protect them; getting the male llama to follow the feed bucket is the key. Another technique is to use a leashed llama or goat to get the other animals to follow you into the enclosure. Do not try to drive or rush the animals; let them naturally follow into the enclosure. Having adult volunteers at the edges to gently urge stragglers to move in the desired direction helps keep the flock together and enter the enclosed area at one time so you can close the gate.

Food

Try to repair or improvise enough fenced grass (St. Augustine, bahiagrass, bermudagrass, native grasses, etc.) to provide grazing for livestock. One acre of grassy area can support 5 sheep, goats or alpacas, but half the number of llamas. Livestock penned in areas where they cannot graze will have to be fed hay (do not feed alfalfa hay because animals may bloat) or freshly cut grass. In an emergency, a machete can be used to cut native grasses to be fed on a daily basis to livestock. In the best circumstances, you or your community will have bought some emergency supplies of grass hay before the hurricane. If this has not been done, you will have to cut and bring about 3 pounds of grass hay per small ruminant each day (one square bale will feed about 15 to 20 small ruminants each day). Do not feed any more than about a quarter of a pound of grain per small ruminant each day (feeding too much grain can cause bloat, scours, acidosis and other digestive problems).

Health

Once animals are gathered, controlled and fed, they can be separated and inspected for health problems. This is a good time to record identifying tattoos, ear tags and collars that will help identify animal owners who can be informed of where their animal is. Hopefully, you and your community have made arrangements with local veterinarians for a contingency like this. To assist veterinarians, be sure to have adult volunteers who are familiar with safely handling small ruminants. If animals are injured beyond

treatment, they should be humanely put down.

Hurricane preparedness includes having a community plan before the hurricane arrives that has:

- Designated person or agency in charge of small ruminant emergency preparedness
- Designated fenced area, such as a ball field, where roaming animals can be collected or a supply of livestock panels and materials to make temporary pens, shelter and fencing, water troughs, hay racks, etc.
- “Chain of command” plans for purchasing hay, feed and storing water at the designated site as well as prepared volunteers/staff to help gather and handle animals
- Designated veterinarian prepared to assist with livestock health
- List of community goat, sheep, alpaca, and llama owner addresses and phone numbers so collected livestock can be returned

After the hurricane event, emergency conditions may require volunteers to take many of these duties on themselves to make sure livestock are safe, well nourished, humanely treated, and returned to their rightful owners.





Marina Owners—Action to Take after a Hurricane

Hurricanes may cause extensive damage, such as flooded roads, downed powerlines and washed-out beach or river areas. Checking the condition of your facility is a main concern, but there may be impediments that prevent your accessing it. As you and your employees return to the facility and begin preliminary damage assessment, be aware of the following potential problems:

- Beware of snakes when going into grassy areas or other locations. Advise employees to wear boots and to look carefully at an area before placing their hands or feet in it.
- Be aware of downed electrical wires, which always should be considered “hot.” Avoid downed electrical wires, and notify the power company or electrical maintenance authorities. Although your buildings or docks may be without power, generators may be operating; if so, the electrical lines will be charged.
- Check natural gas leaks by smell only. NO matches or candles.
- Check facility fueling docks and tanks for leaking gasoline or diesel fuel.
- Check building, shop and dock electrical wiring completely before you turn on the main power switch.
- Check and, if necessary, repair electrical equipment that has been submerged in water before it is started.
- Report broken sewer or water mains owned and maintained by the facility immediately to the utility company or maintenance authority responsible for the repair.
- Inspect and if necessary repair or replace wet electrical appliances such as hot plates, toasters, calculators, typewriters, etc. before you attempt to operate them.

■ IFAS publication DPR-0725. Published June 1998, reviewed April 2004 by Don Jackson, special projects coordinator, Florida Sea Grant Program. (Formerly DH-066.) It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For a list of program products, visit: <disaster.ifas.ufl.edu>.

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Prepare a written assessment of damages as soon as possible. Estimate damages to docks, piers and other marina facilities: cranes, mast hoists, boat sheds, toilets, showers, lockers, offices, fuel dock and office, electrical transformers, electrical service and telephones.

Report theft or vandalism to the police or other law enforcement authority so that appropriate actions can be taken. Obtain the incident number and, if possible, a copy of the report to back up an insurance claim or report of property loss to the IRS.

Properly document and file all insurance claims before you begin your repairs. An appraiser may be assigned by your insurance company to assist the claims adjuster in determining the extent of damage. Insurance companies establish storm claim offices to handle the numerous claims that occur after a hurricane strikes. In catastrophic conditions, extra people are assigned to handle claims in the area where the disaster has occurred.

Notify third-party vessel owners, captains, caretakers and others with vessel interests without delay. Respond to inquiries about vessel status as best as possible, especially if no damage has occurred to the property.

Vessel owners may want to return to marinas or yard facilities right away. Let them know the situation at your facility and the availability of berthing spaces. If damage to your facility prevents you from being able to provide a berthing space for the vessels, let the owners know when you expect to be able to provide a berth.

If your facility is relatively undamaged, make efforts to become operational so you may provide service for those who need it.

You may need to control access to and the security of your facility. Plan how to handle:

- Members and non-members in the case of yacht clubs
- Tenants and non-tenants in the case of marinas or other facilities
- Radio, television and press representatives
- Outside salvage contractors, repairers, estimators, surveyors, adjustors and appraisers.

Many other precautions can be taken before, during and after a hurricane strikes. The procedures mentioned may not cover all actions that should be taken, but use the information provided as a guideline and checklist for developing a hurricane plan. Specific measures or precautions unique to your operations can be fit into your facility's checklist. Only by being prepared in advance will you be able to reduce loss and damage caused by a hurricane.



Florida Dept. of State

Vessel Owners — Action to Take after a Hurricane

After the hurricane has passed, there may be extensive damage in the area. While checking the condition of your vessel is an important concern, there may be limitations such as flooded roads and downed power lines. A check of the vessel should be made as soon as possible to determine its condition and security.

Other vessels may be upriver, behind your vessel mooring location. This may require that you modify your mooring if you are in the center of a canal or stream so that other vessels can navigate past you. If you don't, others may just cut your mooring lines and let your vessel drift, causing more damage than the hurricane.

A check of vessel security is important if damage has occurred. One security aspect that must be considered is the prevention of looters or others who feel that a damaged vessel is abandoned and thus theirs to take.

If your boat was moved prior to or during the storm, be aware that your home marina may not be able to take it back until repairs are completed on their facility. Temporary moorage may not offer the same security as your usual place. Thus, extra care should be given to remove valuable items and to check the boat frequently.

If there has been any theft, vandalism, or damage to the vessel other than storm-related, report it to local police or other law enforcement authorities so that appropriate actions can be taken. Obtain the incident report number and, if possible, a copy of the incident report to back up insurance claims or IRS loss reports.

If the vessel incurs damages, immediate action should be taken to save the vessel and/or equipment and prevent further loss or damage. This action is a requirement of all insurance policies. A vessel owner is expected to take those actions that a prudent uninsured person would take to save and preserve his property.

If the vessel appears to be unrepairable (constructive total loss), arrangements will still have to be made to remove the hull from any navigable waterway, as this will probably be required by government authorities. The vessel should be moved

■ IFAS publication DPR-0726. Published June 1998, reviewed April 2004 by Don Jackson, special projects coordinator, Florida Sea Grant Program. (Formerly DH-067.) It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For a list of program products, visit: <disaster.ifas.ufl.edu>.

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to a yard or salvage facility storage area.

If salvage removal of your vessel is required (emergency or otherwise) and you are unable to receive advice from your insurance company, agent, marina or yacht club, screen the salvage contractor for competence and cost. Read the contract, and know where your vessel is going and what level of security will be provided at the location. Save as much equipment from the vessel as possible.

Where vessel damages are repairable, an immediate arrangement should be made with a reputable repair yard to have the vessel moved there, if necessary, for repairs. Make a list of repair facilities that you would like to work with. Obtain estimates before proceeding with repairs. Owners who act quickly will be back in the water first.



First Aid for Damaged Beaches and Dunes

Sandy beaches and dunes along our coasts form a fragile and dynamic system. As the first lines of defense against the sea when storms hit, dunes act as flexible barriers to high tides and winds. Dunes may yield to storm winds and water, but the shifting mounds of sand will reappear in time.

■ Adapted by UF/IFAS from the Mississippi-Alabama Sea Grant Consortium.

■ IFAS publication DPR-0727. (Formerly DH-034.) Published June 1998; revised April 2004 by Don Jackson, special projects coordinator, Florida Sea Grant Program; additional revisions September 2005 by Debbie Miller, associate professor, Wildlife Ecology and Conservation, and Mark Thetford, associate professor, Environmental Horticulture, both of West Florida Research and Education Center. It is part of The Disaster Handbook, a component of the IFAS Disaster Information Program. For a list of program products, visit: <disaster.ifas.ufl.edu>.

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As winds carry particles of sand across beaches, they are slowed by anything—a grass stem, a log, a piece of trash—and drop a portion of their load of sand. If the obstacle to the wind is a plant, the growth of the plant will keep up with the gradual accumulation of sand, and a small mound will form. The process continues until a sand dune covered by its community of grasses rests on the shore. However, if sand is initially trapped by inanimate objects, the accumulation will be temporary, and the sand will eventually continue its wind-driven migration inland. Establishing a stable dune requires the constant sand-trapping of grass stems and leaves and the mat of roots to bind and hold the sand grains in place against the wind.

Natural recovery of damaged beaches and dunes is a slow process, and where damage is severe, as from hurricanes, it may be desirable to assist the natural processes to speed up the rebuilding. Shoreline-property owners may consider a number of approaches to restoration. Some efforts have little or no costs other than work-hours expended, while others may be expensive in both money and time. Though all alternatives listed below are effective, combinations of two or more compatible techniques will give more rapid results. The results for each follow the listing.

Aid for Damaged Beaches and Dunes

- Restrict traffic flow, pedestrian and vehicular, over damaged area to allow maximum recovery of remaining vegetation.
- Fertilize remaining vegetation and seedlings to enhance regrowth.

- Erect barriers to promote sand accumulation by the use of brush fences or slat fences.
- Revegetate damaged area with purchased plants or transplants from surviving vegetation.

Restricting Traffic

All efforts should be made to protect struggling plants from the additional damage of traffic through disturbed areas. Where crossing the dunes is necessary, temporary boardwalks may minimize any damage. However, this is effective only if the walks are used. Public awareness is the best approach to reduce traffic damage.

Fertilization

Fertilizers should only be used sparingly in beach and dune areas because excess nutrients may alter development and diversity of coastal plant communities. Suggested rates and timing of fertilization for dune areas should also take into account the sandy nature of the soil. Since most sands are infertile, the addition of fertilizer will increase plant growth and result in a denser cover in shorter period of time. However, soluble fertilizer nutrients, such as nitrogen, will quickly wash or leach through the soil profile away from the reach of the plants into the groundwater. Managers should utilize a strategy of applying a less soluble, slow-release form of nitrogen or apply a soluble fertilizer more frequently but in smaller quantities.

Regardless of the release rate or solubility of the fertilizer, the maximum annual application of nitrogen should not exceed 150 to 200 pounds of nitrogen per acre and phosphorus should not exceed 50 to 60 pounds P₂O₅ per acre. These values convert to about 3.5 to 4.5 pounds of nitrogen per 1,000 square feet and 1.0 to 1.5 pounds P₂O₅ per 1,000 square feet. Since the sandy soils cannot retain the nitrogen fertilizer, this annual application should be split into three to four equal applications of no more than 1.0 lb N/1000 sq. ft. per application when using a soluble fertilizer. Fertilizer with a ratio of 3 parts N to 1 part P₂O₅ is ideal, but many fertilizer materials can be used to supply these rates. These maximum applications rates will allow a greater efficiency in the use of fertilizer nutrients since sandy beach soils do not have the ability to store them.

Slow-release Fertilizer — Newly planted Sea Oats may be fertilized with a slow-release fertilizer product at the time of planting. Apply a complete (N-P-K) fertilizer which contains a slow-release nitrogen (e.g., 16-4-8 or 15-4-15) to provide up to 4.5 pounds of actual nitrogen per 1000 square feet. Look for the words slow-release or controlled-release on the fertilizer labels. Nitrogen in this type of fertilizer will not burn or wash away as readily as quick-release (soluble) nitrogen sources.

Soluble Fertilizer — A complete fertilizer with a soluble source of nitrogen may be applied about two weeks after planting. A complete fertilizer such as 8-8-8 or 16-8-8, with the nitrogen in a soluble form (ammonium sulfate, ammonium nitrate, sodium nitrate or urea) should not be applied at more than 50 pounds of nitrogen per acre (1.0 lb N/1000 sq. ft.) per application.

Sand Fences

Sand fences may be erected to trap and accumulate sand. Fences should be placed crosswise to the winds carrying the sand. In general, a fence parallel to the shoreline is most effective. If sufficient funds are available, two lines of fencing, 15 to 20 feet apart, are effective. Fence lines should be well above high water to prevent wave destruction and far enough back on the upper beach so that winds can move

an adequate supply of sand inland (a minimum of 200 feet is recommended). Care should be taken in locating fences to avoid burying existing plants. Fences should not be so high that sand accumulates more rapidly than the growth rates of beach plants, thus burying them (maximum of five feet).

Brush Fences

Brush piled or spread loosely will effectively trap sand. Furthermore, little sand is lost from these piles as the wind shifts direction. For extensive use, brush must be readily available in large quantities at a reasonable cost.

Brush will collect more sand if placed in a standing position. Dig a trench 1½ feet deep and 6 inches wide. Place the butt end in the trench and firmly pack sand around it. To increase the stability of the brush in the upright position, fence posts with boards between them are often needed to support the brush. Posts spaced 8 to 20 feet apart will probably hold up the fence.

Discarded Christmas trees make good fences but availability is seasonal. Local shrubs, such as willow and wax myrtle, may take root, therefore they should be used if available.

Brush fences are unsightly until buried and may be damaged by picnickers seeking firewood. However, they are as effective as slat fences, and much more economical.

Slat Fences

Slatted fencing, such as commercial snow fence, is superior to solid materials for collecting sand. On the beach, 4-inch slats, 2 to 3 inches apart are typical. Anchor posts spaced 8 to 10 feet apart should be set 3 to 4 feet deep in the sand to withstand the winds and the weight of accumulating sand.

Where large amounts of sand blow about, fencing is buried quickly and additional fences may be erected to make the dune higher. Placing brush at the base of the fence will hasten sand trapping.

Revegetation

Fences, brush and other non-living barriers are only temporary measures used to stabilize sand. When they become buried, the sand moves on. Vegetation has proven more effective. Salt- and sand-resistant grasses grow upward through fresh sand deposits and spread laterally, forming a dense cover. Lateral growth, above-ground by stolons and below-ground by rhizomes, helps stop sand removal.

To grow well at the ocean shore, a plant must be able to tolerate up to several feet of sand accumulation per year, sand blast strong enough to take the paint off a car, salt spray, salt-water flooding, drought, heat and low nutrient supply. Those species occurring naturally in an area are usually best adapted to local conditions and should be utilized where possible. However, in badly damaged areas, plants of native species should be obtained from nurseries before thinning natural stands.

Planting Guidelines

To be successful, plant where a dune would most likely occur in nature—in the path of blowing sand parallel to the high-tide line. Start dune plantings as far as possible from the water since the dunes grow toward the sand supply, which is usually the surf zone. Several hundred feet from the high-tide line is best. Whenever feasible, leave room for 2 or more dune lines—a double line of protection. A grass planting 40 to 50 feet wide can trap several cubic yards of blowing sand per foot of beach in a year.

- Space mounds 18" apart on all sides, one plant per mound (1000 plants per 50x100 feet area)
- Small areas and steep slopes should be planted by hand by setting plants into individual holes made with a shovel or dibble. Pack sand firmly around each plant. Larger and smoother sites can be planted more economically with tractor-drawn transplanters.
- A mixed planting with more than one species will usually provide better results in terms of disease and pest resistance, survival and coverage rates.
- Taking transplant material from damaged areas should be done with great care, and only if necessary. Leave at least half of the original material. Younger plants transplant better than older, longer-rooted plants. Wrap roots with moist dirt in burlap or newspaper. Transplant as quickly as possible.
- Graduated planting with greater spacing (up to 4 feet apart) around the edges allows sands to get to the middle of the planting and build a wide dune area.
- A sand fence in the middle of the planting area will help collect sand for the first 6 months while the plants get started.
- Fertilizer may be applied to transplants as an additional aid to successful plant establishment. During the first year, 3 or 4 equal applications (not to exceed 200 pounds of Nitrogen per acre) should be applied during the spring and summer. In the second year, reduce to 2 to 3 applications (not to exceed 150 pounds of Nitrogen per acre) with a single application the third year (not to exceed 50 pounds of Nitrogen per acre). Fertilizers should only be used sparingly in the beach and dune areas because excess nutrients may alter development and diversity of coastal plant communities.